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SUMMARY OF RECENT ABSTRACTS *

I. CHOLERA †

General

POLLITZER (p. 183) has continued his series of monographs on cholera by publishing the fourth part (comprising some 160 pages), which sums up the literature on the aspects of the vibrio relating to immunology. In the fifth part (p. 315) he performs the same function for the literature on investigations of cholera bacteriophage. Several phages have been isolated, and their actions are analysed, including their possible effect in producing mutation in *V. cholerae*. The sixth part (p. 882) deals with pathology, including pathogenesis, infection by various routes, the action of the toxin, morbid anatomy, and the distribution of the vibrio in the body. Like the other parts this is a careful and detailed account and appraisal of a mass of published work, which will be of permanent value to all workers on cholera.

Aetiology

In examination of rectal swabs taken from patients with cholera-like symptoms during the decline of a cholera epidemic BANERJEA and BHATTACHARYYA (p. 587) observed that plating on bile salt agar gave 13.7 per cent. positive results, but that plating on Wilson and Reilly medium gave 21.4 per cent.; the two methods together raised the total to 25 per cent.

In a paper read at a congress in 1947, but published in 1955, MUKHERJI

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1956, v. 53. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on cholera in this series, see the January issues of the *Tropical Diseases Bulletin* each year since 1939.

(p. 438) reports that, in an outbreak of cholera in Lucknow, strains of *V. cholerae* were isolated which were agglutinable by O Ogawa or Inaba serum but were haemolytic. He considers that they were responsible for the outbreak, but suggests on epidemiological grounds that they may be different from the Celebes vibrio. In comment Gilmour suggests that they were probably related to the El Tor vibrio.

DUDANI (p. 316) has used successfully the guineapig serum vibriocidal test for identification of rough strains of *V. cholerae*; this serum killed only those strains which had a rough element, and the author remarks that it is important that serum should be tested before use to make sure that it kills a known rough strain but not a known smooth strain.

FRETER (p. 50) has succeeded in infecting, by intragastric administration of a streptomycin-resistant strain of *V. cholerae*, guineapigs whose intestinal flora had been reduced by starvation and administration of streptomycin. Symptoms developed within 12-48 hours and the infection was fatal, though some batches of guineapigs were less susceptible than others; the caecum was found to be full of fluid and the disease resembled human cholera. Endotoxin of *V. cholerae* did not produce any effect when given by mouth, but killed the animals when given intraperitoneally. Boiled vibrios and mucinase both gave protection when given intraperitoneally. Once the disease was acquired, however, its course was the same whether immunization had been carried out or not. The author suggests that human resistance to enteric disease may depend on the inhibitory action of the normal flora, and the virulence of an organism on its power to overgrow the normal flora. The same author (p. 747) investigated the serological characteristics of the mucinase produced by various strains of *V. cholerae* and water vibrios; antisera were prepared by injection of the mucinase into rabbits. He recognizes 2 types, neither of which is identical with the receptor-destroying enzyme. Water vibrios produced mucinase serologically related to that from *V. cholerae*, and the author concludes from this work that the titre and type of mucinase produced have no relation to the virulence, colony morphology or O antigenic structure of the vibrio, and that the experiments give no information on the part played by mucinase in the pathogenicity of the cholera vibrio. LAM *et al.* (p. 748) have found that mucinase introduced into the intestine of the mouse alters its permeability, and that this effect can be blocked by active or passive immunization against the mucinase. These results support the suggestion that mucinase should be added to cholera vaccine. CHUGH *et al.* (p. 1340) found that the mucinases produced by strains of *V. cholerae* and related vibrios comprise 3 groups. Further work is needed to determine the relationship between mucinolytic and toxic activities and whether these factors are significant in immunity.

LAHIRI *et al.* (p. 1424) found that strains of *V. cholerae* Inaba recently isolated in Calcutta varied greatly in their sensitivity to penicillin and other antibiotics. In general they were less sensitive to penicillin G and

dihydrostreptomycin than to tetracycline, chlortetracycline and chloramphenicol.

OLITZKI and OLITZKI (p. 1115) found that streptomycin-dependent strains of *V. cholerae* were non-virulent for animals but could be used successfully to immunize them against virulent strains.

Pathology: Treatment

CHAKRAVARTI and MONDAL (p. 992) observed two types of reaction by the kidney in cholera. In one there was transient renal failure following the extreme fall of blood pressure, which was quickly reversed by proper administration of fluid. In the second type the initial shock stage and the ischaemic process in the kidney were obviously too long at work, and the renal damage was not easily reversible; this type may be fatal.

BANERJEE *et al.* (p. 1425) found low levels of plasma bicarbonate in cholera, but normal oxygen content of whole blood. There is therefore acidemia but not anoxaemia, in cholera.

The function of the suprarenal gland in the toxemia of experimental cholera in the mouse was investigated by GALLUT (p. 588), who used the toxin of an Inaba strain. Removal of the suprarenal renders the mouse susceptible to the toxin, but this is counterbalanced by cortisone given before the toxin; corticotrophin has some effect also. Cortisone probably protects against the enterotropic fraction of the toxin, but its therapeutic action might be limited by lack of protective action against the neurotropic toxin.

LAIGRET (p. 49) writes of the treatment of cholera, mentioning isotonic and hypertonic [not hypotonic as in the abstract] saline, and parenteral aureomycin. He has also used corticotrophin in a few cases, and states that 75-100 mgm. divided over 24 hours was enough to transform the clinical picture in a spectacular manner. DE *et al.* (p. 587) think that cortisone may be useful in the treatment of cholera in the critical phase of dehydration, and to provide a rational basis for such treatment they examined the blood of patients for evidence of suprarenal activity, finding a rise in red cells and haemoglobin and a neutrophil leucocytosis with reduction in lymphocytes and eosinophils. The changes were similar to those occurring in mice subjected to alarm stimuli, and most patients showed hypoglycaemia which may have been a manifestation of advanced shock and due to deficiency of cortical hormone.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

LANGUILLON, J., MOUCHET, J., RIVOLA, E. & RATEAU, J. Contribution à l'étude de l'épidémiologie du paludisme dans la région forestière du Cameroun. Paludometrie, espèces plasmodiales, anophelisme, transmission. [**Epidemiology of Malaria in the Forest Zone of the Cameroons**] *Méd. Trop.* Marseilles. 1956, May–June, v. 16, No. 3, 347–78, 2 maps & 2 graphs. [29 refs.]

The authors give a systematic description based on their own researches and a study of the literature of the epidemiology of malaria and of the anophelines of the forest zone in the south of the Cameroons. Data on the parasite and spleen rates in children, infants and adults show that in general malaria is holoendemic. *Plasmodium falciparum* predominates, *P. ovale* is present in 1.1 per cent. of positive films, *P. malariae* in 7 per cent. and *P. vivax* is not recorded. The following anophelines are recorded: *A. gambiae*, *A. gambiae* var. *melas*, *A. moucheti*, *A. nili*, *A. funestus*, *A. hancocki*, *A. wellcomei*, *A. coustani*, *A. obscurus*, *A. marshalli*, *A. paludis*, *A. cinctus*, *A. rhodesiensis*, *A. rageai*, *A. free-townensis*, *A. jebudensis*, *A. brunnipes*, *A. longipalpis*, *A. rufipes*, *A. pretoriensis*, *A. pharoensis* and *A. squamosus*. An analysis is given of the behaviour of the adult and aquatic forms of these species together with their relationship to malaria.

There is comment on varying exophily and endophily in *A. gambiae* which appears to depend on the availability of suitable outside resting places. The species is not numerous. Its truly natural breeding places are few but probably important, as they persist despite all methods of control and from them the insect spreads to numerous man-made breeding places from which the bulk of mosquitoes emerge. *A. moucheti*, of which a considerable description is also given, is considered an important vector. The sporozoite rate is low though this is counter-balanced by the great frequency of the species in the forest zone. Infection has also been found in *A. nili*. *A. funestus*, an undoubted carrier in the north, is here rare and perhaps no more than but a secondary and localized carrier.

G. Macdonald

SICART, M. Sur la présence d'*Anopheles algeriensis* Theobald en Roussillon. [**Presence of *Anopheles algeriensis* in Roussillon Province (France)**] *Montpellier Méd.* 1956, May, v. 49, No. 5, 480–81.

I. CANALIS, A., DE NEGRI, U., FRIZZI, G. & SEPULCRI, P. Nuovi orientamenti per lo studio delle specie anofeliche del gruppo "Maculipennis" in zona malarica trattata con DDT. Importanza dei cromosomi salivari delle larve e tecnica per la loro preparazione e lettura. [**New Observations on the Study of Anophelines of the maculipennis Group in Malarial Zones treated with DDT. Importance of Salivary Gland Chromosomes in the Larvae and Methods for preparing and studying them**] *Riv. di Malariologia*. 1956, June, v. 35, Nos. 1/3, 21-37, 12 figs. [12 refs.] English summary (8 lines).

II. ———, ———, ——— & ———. L'anofelismo nel Veneto dopo dieci anni di trattamento con disinfestanti ad azione residua. (Classificazione delle specie col metodo Frizzi.) [**Anophelism in Venice after 10 Years of Treatment by Residual Spraying. Classification of Species by Frizzi's Method**] *Ibid.*, 39-57, 6 maps (1 folding) & 8 figs. [14 refs.] English summary.

I. The first paper gives technical details for preparing salivary glands of fourth stage larvae of the *Anopheles maculipennis* group for identification of the species [subspecies] from the structure of the chromosomes. The method is in use in Italy [see FRIZZI, this *Bulletin*, 1953, v. 50, 597, 1004; 1954, v. 51, 454] where, owing to residual spraying with DDT, larvae are more easily obtained than adults. Diagrams and photographs illustrate the means of dissecting out larval glands, and show the structure in detail of the chromosomes. The chromosome complement is 3 pairs and their structure in *A. m. atroparvus* is taken as a standard. Chromosome I (also X, or the sex chromosome) is diagnostic for *A. m. messeae* which alone shows a re-arrangement from the standard in the structural detail of the chromosome. This is known as an inversion. Chromosome II is without diagnostic value. Chromosome III is valuable for differentiating the remaining members of the complex by reference to the presence or absence of inversion in its two arms, D and S. The details are summed in a table.

II. This paper reports on the results obtained by such cytogenetic observations on larvae collected in the DDT-treated zone of the coastal provinces of Italy along the Gulf of Venice. Although many breeding places with larvae are reported, adults are not found. Most of the breeding is at the periphery of the treated area and is thought to be due to invasion by adults from beyond it. Of 7,444 positive breeding sites, 339 and 92 bred, respectively, *A. m. sacharovi* and *A. m. atroparvus* and the remainder *A. m. typicus* and *A. m. messeae*. Maps illustrate their distribution in the provinces; there are further diagrams and photographs of chromosome patterns. There is no good evidence of species which are domestic in their adult behaviour adopting extra-domestic habits.

D. S. Bertram

SHAHGUDIAN, E. R. **Notes on *Anopheles marteri* Senevet and Prunelle, 1927.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1956, June 29, v. 31, Pts. 4/6, 71-5, 2 figs. [34 refs.]

MATHIS, W., SCHOOF, H. F., QUARTERMAN, K. D. & FAY, R. W. **Insecticide Resistance of *A. quadrimaculatus* in Bolivar County, Miss.** *Pub. Health Rep.* Wash. 1956, Sept., v. 71, No. 9, 876-8.

DDT, dieldrin, toxaphene, endrin, gamma BHC, aldrin and chlordane have been used extensively in Bolivar County, Mississippi, both as pesticides in agriculture and for malaria control. Despite the widespread use of DDT residual applications, no resistance to this chemical has arisen in *Anopheles quadrimaculatus* whereas a high degree of resistance has developed to dieldrin, chlordane and gamma BHC.

The susceptibility of the Bolivar strain of *A. quadrimaculatus* has been compared with that of a normal susceptible strain from Savannah, Georgia. Female mosquitoes were exposed to plywood panels treated with known dosages of DDT, gamma BHC, dieldrin and chlordane. While there was 98 per cent. mortality of the Savannah strain with 25 mgm./sq. ft. dieldrin there was practically no kill of the Bolivar strain even at 200 mgm./sq. ft. The Bolivar strain showed a high resistance also to BHC and chlordane. Both strains were, however, susceptible to DDT.

W. Z. Coker

CHANG, T. L. & HUANG, T. C. **A Practical Guide to the Identification of Anopheline Mosquitoes in Taiwan, China.** Reprinted from *Chinese Med. J.* Taipei. 1954, v. 1, No. 4, 341-6, 16 pls. (1 folding). **Part II. The Larvae.** *Ibid.*, 1955, Nos. 1/2, 57-77, 16 pls. (1 folding). [37 refs.]

For use in the field as well as in the laboratory this illustrated and annotated guide to the anopheline mosquitoes of Taiwan is an admirable publication. It has been compiled by experienced authors and revised several times to make it simple and accurate. Part I deals with the adults and Part II with the larvae of 16 species and subspecies of *Anopheles*. They are arranged in alphabetical order as follows:—*aitheni*, *bengalensis*, *annularis*, *barbumbrosus*, *fluviatilis*, *gigas baileyi*, *hyrcanus sinensis*, *insulaeflorum*, *jeyporiensis*, *candidiensis*, *leucosphyrus*, *lindesayi*, *ludlowi*, *maculatus*, *minimus*, *splendidus*, *subpictus*, *indefinitus*, and *tessellatus*.

The species are not formally described but the external characters are indicated by which they may be distinguished from one another and brief accounts are given of their bionomics and relation to disease.

Illustrations include figures of entire females as well as pictorial keys to adults and larvae. There is a list of references to the literature and at the end identification keys in Chinese.

H. S. Leeson

SERGEANT, Ed. & SERGEANT, Et. **History of the Concept of "Relative Immunity" or "Premunition" correlated to Latent Infection.** *Indian J. Malariology*. 1956, Mar., v. 10, No. 1, 53-80. [Numerous refs.]

This paper gives a clear exposition of the authors' views on premunition, defining the various terms and concluding with a short account of the protective action in man and animals of vaccines against malaria, tuberculosis, syphilis, brucellosis, relapsing fever, trypanosomiasis, piroplasmosis, typhus and virus diseases.

The table below compares the characters of true immunity and premunition.

True immunity	Premunition
Complete resistance acquired by a host which, clinically cured, is at the same time deparasitized.	Relative resistance acquired by a host which, clinically cured, remains a carrier of latent germs.
Prevents re-infections.	Prevents superinfections even though the host remains a carrier of germs, but does not prevent re-infections from the time it ceases to be a carrier.
Survives the disappearance of the parasites.	Correlative to the visible or latent presence of parasites.
Establishes itself after recovery.	Ceases with recovery.
Is conferred by killed vaccines.	Is conferred by living vaccines.
Is accompanied by the formation of abundant antibodies after recovery. Hence possibility of serotherapy.	Does not form abundant antibodies after recovery. No serotherapy with the serum of the recovered.
Conferred by acute diseases.	Conferred by chronic infections.

P. C. C. Garnham

JEFFERY, G. M., YOUNG, M. D. & EYLES, D. E. **The Treatment of *Plasmodium falciparum* Infection with Chloroquine, with a Note on Infectivity to Mosquitoes of Primaquine- and Pyrimethamine-Treated Cases.** *Amer. J. Hyg.* 1956, July, v. 64, No. 1, 1-11. [14 refs.]

The subjects of the experiments recorded in this paper were patients suffering from general paresis, most of them Negroes. Three strains of *Plasmodium falciparum* were used, 2 from South Carolina and 1 from Panama. Infection was induced either by mosquito bite or by transfusion of infected blood.

Over 100 patients were treated with chloroquine, the usual regimens employed being a total of 1.5 gm. base orally as diphosphate (0.9 gm. on day 1; 0.3 gm. on days 2 and 3) or 0.4 gm. base intramuscularly as hydrochloride in a single dose. Clinical response and clearance of asexual parasitaemia were rapid in all cases. Relapses occurred after treatment of 3 out of 18 patients with 0.4 gm. intramuscularly. A single relapse occurred after a presumed total oral dose of 1.5 gm.

Development of gametocytes was usually prevented by chloroquine treatment begun as late as the 7th or 8th day. Where gametocytaemia was not prevented mosquitoes were infected from 4 to 20 days. It is concluded that the blood in such cases may be infective after treatment for as long as gametocytes are present in sufficient density.

Treatments with quinine-primaquine and chloroquine-primaquine combinations indicated that addition of primaquine will eliminate the infectivity of gametocytes very rapidly. Pyrimethamine given alone does not eliminate gametocytes but renders them non-infective to mosquitoes as rapidly as does primaquine.

G. Covell

RUIZ SANCHEZ, F., RUIZ SANCHEZ, A. & NARANJO GRANDE, E. **The Treatment of Malaria with Tetracycline.** *Antibiotic Med.* New York, 1956, Aug., v. 3, No. 3, 193-6, 2 figs. [10 refs.]

Undeterred by the poor results previously achieved by themselves and other workers in the prophylaxis and treatment of malaria with antibiotics [this *Bulletin*, 1950, v. 47, 438, 444; 1951, v. 48, 523; 1952, v. 49, 597; 1953, v. 50, 380], the authors have treated 17 patients (16 *Plasmodium vivax*, 1 *P. falciparum*) with tetracycline (Achromycin), obtained through catalytic dechlorination of chlortetracycline. The drug was administered orally between the 6th and 32nd days of illness, the daily dose being 50 mgm./kgm. of bodyweight, given over a period of 8 to 11 days. No information is given as to the state of premunity of the patients, whose ages varied from 6 to 60 years.

Febrile episodes following treatment ranged from none to 4; the parasites persisted in the peripheral blood for 2 to 7 days. No relapses occurred during the period of observation, but this was too short for any conclusions to be drawn about the effect of the drug on the relapse rate. In the *P. falciparum* case the gametocytes remained unaffected.

[The value of antibiotics in the treatment of malaria is necessarily restricted because they must be given in large doses over an extended period, and are slow-acting and expensive, compared with the synthetic antimalarials in current use. The possibility of toxic side-effects must also be taken into account. To the abstracter it seems unlikely that further investigation of the antimalarial properties of this group of drugs will serve any useful purpose.]

G. Covell

ROBERTS, J. M. D. **Pyrimethamine (Daraprim) in the Control of Epidemic Malaria.** *J. Trop. Med. & Hyg.* 1956, Sept., v. 59, No. 9, 201-8, 1 map.

The Nandi District of Kenya has been the site of epidemic malaria since 1931. In May and June 1944 there was a severe epidemic with over 600 deaths. Surveys begun in 1951 measured the annual epidemics: 98 per cent. is due to *P. falciparum* and 2 per cent. to *P. malariae*. The

relatively short transmission season (May to July each year) suggested that interruption in transmission for a short space of time, brought about by the mass simultaneous administration of single therapeutic doses of pyrimethamine, would materially reduce the incidence of malaria and its morbidity. The interruption would be due to the inability of the adult vectors to acquire potent gametocytes during their life span and during this time the drug would be in sufficient concentration in the blood of the community to act successfully as a prophylactic.

The experiment was first carried out in May 1953. The parasite rates in comparable age-groups were compared in a treated and control area before and at the time of the mass treatment, and subsequently at intervals, for 24 weeks. In a treated area the parasite rate, having risen between March and May from 8.3 per cent. to 23 per cent., fell to 2.3 per cent. in 2 weeks after the treatment and later never rose above the dry weather rate of 8.3 per cent. In the control area the parasite rate rose from 18 per cent. to 39.5 per cent. between March and May and continued to rise, reaching 50.7 per cent. in August and had only fallen to 26 per cent. in November.

The epidemic in the treated areas was effectively prevented at a cost of 16 cents (less than 2d.) per person. The experiment was repeated in the following year with similar results and there was a notable reduction in the number of admissions to hospital of patients suffering from malaria.

Owing to the probability of strains of parasite resistant to pyrimethamine being encountered if the same drug were used annually, it is thought that in the future either the more expensive measure of vector control or the use of a different drug will have to be considered.

[At present it is doubtful if any other drug would fulfil the criteria on which the theory of this experiment was based, *viz.* prolonged prophylaxis and sterilization of gametocytes being achieved simultaneously.]

Frederick J. Wright

SALITERNIK, Z. **Mosquito Control in Israel.** *Tavruah.* Jerusalem.
1956, Apr., 13-19, 2 figs. & 1 diagram.

The author is Director of the Antimalaria Division of the Ministry of Health in Israel and in this paper he gives a brief popular account of the history of mosquito control in that country up to the present day.

The situation now is that *Anopheles sacharovi* has been eliminated except in the Huleh region and it is no longer an important vector of malaria in Israel. *A. sergenti* is at present the main vector but its numbers are being reduced. *A. superpictus* and *A. claviger* are now of limited importance.

Malaria incidence has fallen from 1,091 new cases (1.01 cases per 1,000 population) in 1949 to 91 (0.05 cases per 1,000 population) in 1955 in spite of thousands of malaria carriers among new immigrants; and 901 out of 939 settlements are now free from malaria.

The control of *Culex pipiens molestus* is an important part of the anti-mosquito campaign, firstly because the nuisance caused by this pest has lately increased, secondly because it is considered to be a potential vector of West Nile fever, several outbreaks of which have recently occurred, and thirdly because several immigrants have been found infected with filariasis and it has been established that this culicine can become infected in nature.

In recent years *Aedes aegypti* has disappeared from Israel and there have been no cases of dengue.

H. S. Leeson

LANGUILLON, J. Essai d'interprétation des indices de régression après 14 mois de lutte antipaludique au Cameroun. [**Attempts to interpret Regression Indices after 14 Months of Malaria Control in the Cameroons**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 260-65, 1 fig.

The gametogonic index or percentage of gametocyte carriers among persons with *P. falciparum* parasites in their blood is used as an index of the viability of the parasite. On the hypothesis of SAUTET [this *Bulletin*, 1954, v. 51, 343] a high index implies readiness to proliferate, and a low one that the parasite may be dying out in the community. It was measured in the Cameroons where imagicidal control has been practised, but no reduction has been achieved in this index. It was 22.5 and 24.6 per cent. in two control areas and 23.9 and 23.8 per cent. in two neighbouring areas. It is concluded that if imagicidal control were discontinued there would be rapid multiplication of the parasite. If the index does not decrease it might be advisable to combine a gametocidal attack with the present insecticidal control.

G. Macdonald

MASTBAUM, O. **A Comparison between the Use of Dieldrin and Gammexane in the Control of Rural Malaria in Swaziland.** *East African Med. J.* 1956, Mar., v. 33, No. 3, 79-83.

The normal mechanism of malaria control in Swaziland is by the application of 20 mgm. per square foot of BHC to huts twice in the transmission season with an interval of 3 months. In order to test some suggested advantages of dieldrin all the huts, numbering 4,828, in an area of about 600 square miles were given one application of this insecticide at a dose of 35 mgm. per square foot in place of the usual treatment. Rainfall was unusually heavy, providing exceptionally favourable breeding opportunities for *Anopheles gambiae* which was generally very numerous. Despite this the mosquito was rare in houses treated with both insecticides. The parasite rate in the BHC zone rose during the season from 1.1 to 1.8 per cent. and in the dieldrin zone from 0.75 to 3.8 per cent. The single application of dieldrin proved slightly more expensive than 2

applications of BHC, but the comparison may be vitiated by different standards in the 2 zones. It is concluded that in the circumstances of Swaziland 2 applications of BHC are a more appropriate method of control than single applications of dieldrin.

G. Macdonald

JASWANT SINGH, RAY, A. P. & NAIR, C. P. **Relationship of Tuberculosis on the Course and Intensity of Plasmodial Infections in *M. mulatta*.** *Indian J. Malariology*. 1956, Mar., v. 10, No. 1, 3-10, 2 graphs. [19 refs.]

The course of *Plasmodium knowlesi* and of *P. inui* infections was observed in 2 groups of rhesus monkeys—14 non-tuberculous and 19 tuberculous. In the *P. knowlesi* infections the duration of parasitaemia was unchanged, but the density was much lessened in the presence of tuberculosis, e.g. 7 per cent. compared with 65 to 92 per cent., while death was sometimes delayed for 3 days. The actual parasitaemia was in inverse proportion to the degree of tuberculosis. The effect was even more marked in *P. inui* infections: the prepatent period was prolonged from 8 to over 25 days and the peak parasite density fell from 347 per 10,000 erythrocytes to less than 1 in monkeys suffering from tuberculosis. It is possible that this effect is the result of protein or ascorbic acid deficiency in the tuberculous animals, which inhibits the growth of the parasite [this *Bulletin*, 1947, v. 44, 649].

P. C. C. Garnham

JASWANT SINGH, NAIR, C. P. & RAY, A. P. **Therapeutic Effect of Sulphadiazine and Dihydrotriazines against Blood-Induced *P. cynomolgi* Infection.** *Indian J. Malariology*. 1956, June, v. 10, No. 2, 131-5. [10 refs.]

In previous communications, workers at the Malaria Institute of India have recorded the antimalarial activity of quinine, chloroquine, avlocor, nivaquine and amodiaquine [this *Bulletin*, 1954, v. 51, 772], as compared with proguanil, bromoguanide and pyrimethamine [*ibid.*, 1222] and M3349, mepacrine and the active metabolite of bromoguanide [*ibid.*, 1955, v. 52, 515].

In the present paper the results of comparative trials with sulphadiazine, sulphonamide substituted dihydrotriazine (Supazine) and the active dihydrotriazine metabolite of proguanil in *Plasmodium cynomolgi* infections are recorded.

The MED (minimal effective doses) were determined as 0.15, 20 and 6 mgm. base per kgm. body weight of monkey respectively.

Sulphadiazine was found to be 133 times superior to the sulphonamide substituted dihydrotriazine (Supazine) and 40 times superior to the proguanil metabolite.

G. Covell

SERGEANT, Ed. & PONCET, Alice. Étude expérimentale du paludisme des rongeurs à *Plasmodium berghei*. V. Morphologie du parasite. [Experimental Study of Malaria due to *P. berghei* in Rodents. V. Morphology of the Parasite] Arch. Inst. Pasteur d'Algérie. 1956, June, v. 34, No. 2, 139-80, 16 figs. & 3 coloured pls. [Refs. in footnotes.]

This part of the authors' monumental study of *Plasmodium berghei* in rodents is devoted to the morphology of the asexual stages of the parasite and is based on the examination of about 2,000 adult mice and 1,000 rats, infected with the Keyberg 173 strain (through 618 blood passages). There is a useful preliminary study of the red blood cell series of rodents, in which the differential characters of mature cells, polychromatophils and reticulocytes are described.

In two mice 13.13 per cent. of the corpuscles were parasitized; 98.51 per cent. of the corpuscles were mature and 12.29 per cent. contained parasites, 1.07 per cent. were polychromatophils and 70.59 contained parasites, and 0.42 per cent. were reticulocytes and 66.58 per cent. contained parasites. Similar figures for an infected rat were as follows:—1.4 per cent. of the corpuscles were parasitized; 93.33 per cent. were mature of which 0.53 per cent. contained parasites, 6.36 per cent. were polychromatophils of which 12.53 per cent. contained parasites, and 0.31 per cent. were reticulocytes of which 36 per cent. contained parasites.

Two types of schizogony have been observed: the first occurs in mature corpuscles and in acidophil reticulocytes, the second in polychromatophils. The first type is the classical form giving rise to pigmented schizonts containing 8 merozoites (with a maximum of 15 in mice and 18 in rats) and never enlarging the corpuscle. Even in this group, however, pigment was frequently absent, 55 per cent. of the trophozoites and 21 per cent. of the schizonts being non-pigmented. Binucleate rings were not uncommon and perhaps represented a stage of binary fission. Multiple invasions occurred in 15 per cent. of infected corpuscles. No exoerythrocytic stages were found either in acute or latent infections.

A special type of schizogony is described as occurring in the polychromatophils and normoblasts—the chromatin is in the form of punctiform grains and in at least half of the parasites is unaccompanied by cytoplasm. In the early stages such isolated dots of chromatin resemble *Anaplasma*; they could not be confused with Jolly's bodies. The mature form consists of 10 merozoites; sometimes 20 or even 27 are found. The merozoites of this special type of schizont are 3 or 4 times the size of those of the ordinary type. None of the usual pigment is seen in these schizonts; if present at all it is in fine black grains. The polychromatophil does not seem to be a very suitable cell for supporting the growth of *P. berghei*; in fact, it is not uncommon to find pale abnormal parasites in these cells, which are thought to be degenerating forms.

The paper is accompanied by 3 coloured plates which illustrate the

various features described by the authors. [For previous parts, see this *Bulletin*, 1956, v. 53, 1099, 1318.] P. C. C. Garnham

FABIANI, G. & ORFILA, J. Intérêt de l'épreuve péritonéale au cours du paludisme des Rongeurs. [**Course of Intraperitoneal Inoculation of Rodents with *Plasmodium berghei***] *C.R. Soc. Biol.* 1956, v. 150 No. 1, 168-70.

Intraperitoneal inoculation of *Plasmodium berghei* is the usual method of infecting rodents with this parasite. The behaviour of the parasite in the peritoneum before it reaches the blood stream is unknown, and the authors attempted to trace its evolution in normal white mice, in mice suffering from malaria, and in immune individuals. One hundred million parasites were inoculated and samples were taken from the peritoneum, 3, 6 and 18 hours later; sometimes the inoculation was preceded by the injection of peptone broth to provide a supply of leucocytes and macrophages in the peritoneal cavity.

When the mouse was suffering from malaria from a previous intraperitoneal inoculation, the newly inoculated parasites remained for a long time in the peritoneum where they were still numerous after 18 hours. Reticulocytes (infected or uninfected) rapidly matured in the peritoneum when the mouse was in the early stages of an attack, but not otherwise. Intraperitoneal phagocytosis was slight in mice which already had the infection compared with those newly inoculated, and if the latter received immune serum also phagocytosis was extremely pronounced.

P. C. C. Garnham

DEPIEDS, R. & FAURE, A. A propos du rapport protéines totales globulines chez les rats infestés par *Plasmodium berghei*. [**Ratio of Total Proteins to Globulins in Rats infected with *Plasmodium berghei***] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 270-72.

The authors confirm the findings of DE SMET [this *Bulletin*, 1956, v. 53, 156] that the ratio of total proteins/globulins was reduced in rats infected with *Plasmodium berghei*.

The results are given in a table which shows that the average ratios were 1.98 in inoculated rats which did not show parasites, 1.70 in rats with parasitaemia and 1.88 in control rats. H. J. O'D. Burke-Gaffney

WARBURG, M. **An Attempt to produce a Specific Serum against *Plasmodium berghei* in the Rabbit.** *Bull. Res. Council of Israel. Sect. B.* 1955, Dec., v. 5B, No. 2, 144-7, 1 fig.

Rabbits were inoculated intravenously with *Plasmodium berghei* either in hamster or mouse blood (6 injections at 4-day intervals). Serum was

then taken and was tested for its protective power in mice and hamsters respectively. Normal rabbit serum was shown to prolong the incubation period and to diminish the parasitaemia in hamsters inoculated with *P. berghei*; immune serum had a similar effect, but 5 animals out of a group of 40 were completely protected from infection. The administration of normal rabbit serum prolonged the incubation period in mice, but neither normal nor immune serum had any effect on the subsequent course of the disease. The experiments were disturbed by the deleterious effect on hamsters of anti-mouse serum (containing antibodies common to both animals).

P. C. C. Garnham

MCGHEE, R. B. **A Study of Changes occurring in *Plasmodium lophurae* after Three Years of Continuous Existence in Mice.** *J. Protozoology*. Utica. 1956, Aug., v. 3, No. 3, 122-6, 4 figs.

Baby mice were inoculated into the tail vein with heparinized blood containing *Plasmodium lophurae* obtained originally from a chick-embryo-baby-mouse passage [see this *Bulletin*, 1951, v. 48, 619]. The mouse passages were kept up for 3 years; blood from mice showing the highest parasitaemia on each transfer was used. All mice became infected, but none died of the disease though sometimes as many as 70 per cent. of erythrocytes were invaded. After 3 months, infections became much heavier, and this increase continued for another year when the parasitaemia remained approximately stable. The course of the disease was never prolonged for more than 3 weeks, and the pattern of infection in individual mice varied greatly. Gametocytes did not appear until 9 months after the beginning of the mice passages, and only 18 (14 females and 4 males) altogether were discovered after much searching. The murine strain was re-introduced to chick embryos and gave rise to a milder infection than normal, presumably because the merozoite number was smaller (by 50 per cent.) in schizonts in mice as compared with chick corpuscles, and this diminution persisted for 2 passages in the chick embryo.

P. C. C. Garnham

GREENBERG, J. **Mixed Lethal Strains of *Plasmodium gallinaceum*: Drug-Sensitive, Transferable (SP) x Drug-Resistant, Non-Transferable (BI).** *Exper. Parasit.* New York. 1956, July, v. 5, No. 4, 359-70, 2 figs. [14 refs.]

When the BI strain of *P. gallinaceum* lethal to chickens was passaged in mosquitoes together with a benign strain M of the same parasite, the resultant infection, at first lethal to the host, subsequently acquired benign characters. On making the lethal strain resistant to pyrimethamine and passaging it with the benign strain as before [this *Bulletin*, 1955, v. 52, 517] the parasites in resulting infections gave rise to a benign

infection in which their resistant character was maintained. Experiments of similar nature have been continued. The BI strain with 64-fold resistance to pyrimethamine and also to metachloridine, as well as an offshoot made 800-fold resistant to pyrimethamine, has now been passaged with a lethal SP strain in 3-8-day-old chicks: *Aedes aegypti* was used as vector. The results are given in the author's summary:—

“ Mosquitoes were fed on chicks simultaneously inoculated with lethal, transferable, drug sensitive SP strain *P. gallinaceum* and (1) the lethal, BI strain, 800-fold resistant to pyrimethamine or (2) the BI-strain, 64-fold resistant to pyrimethamine and 32-fold resistant to metachloridine. In subsequent mosquito transfers, where no selection was made for pyrimethamine resistance, drug resistance disappeared, and the mortality rate averaged 90% over 8 to 9 transfers. Where selection was made for pyrimethamine resistance after the first mosquito transfer, drug resistance persisted, and the average mortality rate was 33%. Where the BI-pyrimethamine-metachloridine-resistant strain was used, metachloridine resistance could not be demonstrated after 8 transfers, during which selection was made for pyrimethamine resistance.” *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

FROMENTIN, Huguette. Action de l'acide salicylique et de quelques-uns de ses dérivés sur l'infection expérimentale du rat blanc à *Trypanosoma gambiense*. [**Action of Salicylic Acid and Some Derivatives on *T. gambiense* Infection in Rats**] *Bull. Soc. Path. Exot.* 1956, Mar.–Apr., v. 49, No. 2, 272–7.

In an earlier communication [this *Bulletin*, 1956, v. 53, 552] the author has shown that infection with *T. gambiense* in the rat was intensified by treatment of the host with sodium salicylate. The above experiments have been continued with the use in addition of derivatives of the same acid on a total of 60 rats weighing 100 to 200 gm. The animals were given aureomycin to suppress *Bartonella* infections before intraperitoneal inoculation with suspensions of *T. gambiense*. Drugs were given orally and included sodium salicylate, salicylic acid, its *p*-amino derivative (PAS), acetyl derivative (aspirin), as well as the methyl and phenyl (salol) esters.

The blood of control animals and those receiving PAS became negative about the seventh day. Those receiving other drugs suffered a fatal

infection between the sixth and ninth days. The effect of sodium salicylate was increased by addition of benzene. It appeared possible that the activity of these substances lay in the suppression of natural immunity, in which ablastin, lysins and agglutinins may be involved.

J. D. Fulton

BADER, H. **A Search for New Trypanocides. Part II. 4-Amino-6-Dialkylaminoquinaldines.** *J. Chem. Soc.* 1956, Sept., 3293-6.

WOOLFE, G. **Trypanocidal Action of Phenanthridine Compounds: Effect of Changing the Quaternary Groups of Known Trypanocides.** *Brit. J. Pharmacol. & Chemotherapy.* 1956, Sept., v. 11, No. 3, 330-33. [17 refs.]

WOOLFE, G. **Trypanocidal Action of Phenanthridine Compounds: Further 2:7-Diamino Phenanthridinium Compounds.** *Brit. J. Pharmacol. & Chemotherapy.* 1956, Sept., v. 11, No. 3, 334-8.

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

BULGARELLI, R. & MARANZANA, A. La leishmaniosi in Liguria. Indagine epidemiologica su 91 casi di L. viscerale e cutanea. Caratteristiche cliniche di 41 casi di L. viscerale infantile ricoverati in clinica pediatrica. [**Leishmaniasis in Liguria**] *Ann. d. San. Pubblica.* Rome. 1956, May-June, v. 17, No. 3, 749-77. [56 refs.]

The English summary appended to the paper is as follows:—

“The authors point out that the occurrence of leishmaniasis in Liguria is unknown to many scientists, owing to the lack of any publication on the Ligurian cases (with the exception of two short papers published respectively in 1933 and 1935), and stress the fact that, according to recent publications, the disease is apparently moving northwards from South Italy. They then submit the results of their investigation, consisting of an epidemiological-statistical part and of a clinical one.

“Since 1925, 89 cases of visceral leishmaniasis and 2 of cutaneous leishmaniasis, all of them autochthonous, occurred in Liguria. The former involved 80 children and 9 adults; the latter only adults. The age of most subjects did not exceed three years; 8 were less than one year old. Frequency was high in the city of Genoa; the number of cases, however, was relatively larger on the western riviera, especially in the

town of Imperia and the immediate neighbourhood (while Savona and its province were practically spared). Very few cases on the eastern riviera; only one case in La Spezia province. The disease occurred to a greater extent during the winter months, though many cases were observed also in summer. During these last years the disease has become uncommon but has not disappeared.

"The authors finally describe the main features of the 41 cases of visceral leishmaniasis admitted to the pediatric Clinic since 1930, pointing out their similarities and differences with respect to the classical picture of the disease in South Italy and in the Islands."

VERMEIL, C. Chronique des leishmanioses en Tunisie. [**Leishmaniasis in Tunisia**] *Arch. Inst. Pasteur de Tunis*. 1956, June, v. 33, No. 2, 195-201, 1 map. [42 refs.]

This is a list of 164 cases of kala azar reported in Tunisia since 1912, and classified according to geographical distribution, nationality, age and sex. A map shows the distribution, and also that of an unspecified number of cases of oriental sore, which is most common near Gafsa and Gabes, where "numerous" cases are indicated.

A feature of this short paper is the bibliography, which would be useful for those wishing to explore the subject more fully.

Charles Wilcocks

McKINNON, J. A. & FENDALL, N. R. E. **Kala-Azar in the Baringo District of Kenya. Progress Report.** *J. Trop. Med. & Hyg.* 1956, Sept., v. 59, No. 9, 208-12, 1 fig. & 1 map.

The authors follow their preliminary communication [this *Bulletin*, 1956, v. 53, 979] which described the occurrence of 9 cases of kala azar in the Baringo District, with the present progress report which records that 25 other cases were found making 34 in all during a 17-month period and 6 cases subsequently are added in a footnote. The patients were found in small groups mainly located near the main stock routes among the foothills at altitudes of 3,000-4,000 feet. There appears to be a steady increase in the incidence of the disease. The sandflies in this district show little seasonal variation in their numbers. It is at present doubtful whether the present cases portend an epidemic such as occurred in the Kitui District [see *ibid.*, 1954, v. 51, 159]. *Frederick J. Wright*

BHATTACHARYYA, M. N. **Leishmaniasis in Assam. A Study of 150 Hospital Cases.** *Indian J. Med. Sci.* 1955, Oct., v. 9, No. 10, 602-7, 3 figs. & 1 diagram.

Data obtained from 150 cases of leishmaniasis, 140 of kala azar and 10 of post-kala-azar dermal leishmaniasis, are analysed. Out of 140 cases

of kala azar, 59 and 64 came from Lakhimpur, where the hospital is situated, and from Sibsagarh, the neighbouring district, respectively. [This tells us little about the distribution of the disease in Assam but does suggest that kala azar has become a medical problem in Lakhimpur, a northern district of Assam, where some years ago it was of little importance.]

A figure giving the age incidence shows that the median of the age incidence curve is between 20 and 30. [This again suggests a recent shift in incidence to a higher age-group, as it used to be essentially a disease of children and adolescents in Assam.]

The differential leucocyte count showed a polymorphonuclear count below 3,000 per cmm. in 65 per cent. of patients.

In 128 patients the presenting symptom was fever and in 7 there was no fever. The double rise occurred in 42.9 per cent. of patients for whom a 4-hour temperature chart was kept. Of 123 patients who received treatment, 11 died. [This is a high mortality; the treatment given is not stated.]

The author does not state how many patients relapsed, but notes that treatment had been given before in 17 cases of kala azar, and observes that these patients, with the 10 cases of dermal leishmaniasis, constitute a serious reservoir of infection.

L. E. Napier

CHATTERJEE, S. N. **Observations on the Degree of Splenic and Hepatic Enlargement in Kala-Azar and Tropical Splenomegaly.** *J. Indian Med. Ass.* 1955, Nov. 1, v. 25, No. 11, 435-6.

In the clinical differential diagnosis of the splenomegalies commonly encountered in Calcutta it has been considered that if there is proportionate enlargement of the liver and spleen, kala azar is indicated, but if these enlargements are disproportionate, it is probable that the condition is tropical splenomegaly, chronic malaria, leukaemia or Banti's disease.

In order to test the accuracy of this view a study was made of 200 cases of kala azar, diagnosed serologically, and 100 cases of tropical splenomegaly diagnosed by the process of exclusion.

It was found that in 34.5 per cent. of cases of kala azar there was proportionate enlargement of the spleen and liver; this close correlation was particularly observed in the earlier cases of kala azar when the spleen was small, but as the disease progressed the liver enlargement did not keep pace with that of the spleen. On the other hand, in the case of tropical splenomegaly, the close correlation between splenic and hepatic enlargement was only noted in 7 per cent. of cases.

The author concludes that too much stress should not be laid on this particular clinical feature and "a diagnosis of kala-azar should not be discarded on the basis of disproportionate enlargement between the liver and the spleen . . .".

[It would surely be simpler to reduce the matter to terms of liver enlargement. If one takes the total figure of liver enlargement from the two tables and divides the cases (200) of kala azar by half to bring them level with those of tropical splenomegaly (100), ignoring the obvious error in the former table, one gets the following figures for liver enlargement:—

	Not palpable	Moderate enlargement Up to 2"	Considerable enlargement Over 2"
Kala azar	7.5	68.5	24.0
Tropical splenomegaly	17.0	76.0	7.0]

L. E. Napier

ROY, A. N., BANERJEE, G. & BANERJEE, B. N. **A Preliminary Investigation on the Complement-Fixation Reaction in Dermal Leishmaniasis.** *Ann. Biochem. & Exper. Med.* Calcutta. 1955, v. 15, No. 2, 109-12. [11 refs.]

It has been shown [GHOSH *et al.*, this *Bulletin*, 1946, v. 43, 1125; 1950, v. 47, 829] that a positive complement-fixation reaction can be obtained in kala azar by the use of an antigen made from cultures of *Leishmania donovani* on Ray's solid medium. The authors have carried out this test on the blood of 74 patients with post-kala-azar dermal leishmaniasis, clinically diagnosed, and on that of 44 controls; the latter consisted of 11 patients with various skin diseases, 10 with positive Kahn reactions; 10 with leprosy and 13 normal healthy persons.

The technique of the British Medical Research Council was adopted with some modifications. All sera for test were diluted (1 in 5) in isotonic saline. Three minimum haemolytic doses of complement were used in the test proper. Anti-serum prepared by the injecting of *Leishmania donovani* culture into rabbits was used as positive control. A complete inhibition of haemolysis was considered as the only criterion for a positive reaction. Doubtful results were regarded as negative.

Of the 74 patients with post-kala-azar dermal leishmaniasis, 44 (59 per cent.) gave a positive reaction; all the controls were negative.

The authors consider that further work is indicated along the following lines: (a) correlation of the results obtained by culture, smear, and complement-fixation reaction in post-kala-azar dermal leishmaniasis; (b) to ascertain whether the positive complement-fixation reaction is merely a persistence of the reaction observed in kala azar, or whether that reaction fades and later reappears with the appearance of the dermal lesions. [Further, it would be interesting to know if the percentage of positive reactions was as high in those cases of dermal leishmaniasis in which there is no clear history of an attack of kala azar, as in those in which there is such a history; these figures should be available from the data already collected.]

L. E. Napier

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ROGER, F. & ROGER, Annie. Différence de comportement des souches rickettsiennes épidémique et murine dans le poumon du hamster inoculé par voie nasale. [**Difference in Behaviour between Epidemic and Murine Strains of Rickettsiae in the Lungs of Hamsters inoculated Intranasally**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 241-2.

Rickettsia prowazeki and *R. mooseri* are readily cultivated in mouse-lung, where they behave comparably. The authors show that considerable differences occur when they are inoculated intranasally into hamsters. Very small quantities of an African strain of *R. mooseri* were sufficient to establish the strain in hamsters and to permit serial transmission. From the first passage, a massive and rapidly fatal pulmonary infection occurred and in stained smears large numbers of free rickettsiae were found.

With *R. prowazeki* only a transient pulmonary infection occurred and serial transmission was difficult. Even after massive doses, pulmonary lesions were found only at the height of the infection and few rickettsiae were found in smears and then almost entirely in the cytoplasm.

Evidently the susceptibility of the respiratory tract to rickettsial infection may vary greatly between different animal species. This fact may be valuable in differentiating between epidemic and murine strains.

H.-J. O'D. Burke-Gaffney

WHITTEMORE, F. W., Jr. **Susceptibility of Western European Body Lice to Pyrethrum and DDT.** *U.S. Armed Forces Med. J.* 1956, Oct., v. 7, No. 10, 1493-9.

"Strains of West German and East German body lice were evaluated for their susceptibility to DDT and to pyrethrum louse powders. While a minor difference was found in the susceptibility of the two strains, the West German strain exhibiting a slight resistance to DDT, both strains can be adequately controlled with either 10 per cent DDT powder or pyrethrum powder. *Eleven-year-old stocks* of pyrethrum louse powders were found to be completely effective."

[See this *Bulletin*, 1953, v. 50, 399.]

EVANS, A. D. **Q Fever in South Wales.** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service (directed by Med. Res. Council).* 1956, Sept., v. 15, 215-19.

The incidence of *Rickettsia burneti* in dairy cattle in South Wales was studied by inoculating raw milk in amounts of 2 ml. into guineapigs and

testing the sera of the inoculated animals for specific complement-fixing (CF) antibodies after an interval of 6 weeks. The antigen used in the test was prepared from the Nine Mile strain of *R. burneti*, and sera fixing complement at a titre of 1 in 16 or above with this antigen but not with *R. prowazeki* antigen were regarded as positive. The results obtained were as follows:

	Total samples	No. of samples producing CF antibodies for <i>R.</i> <i>burneti</i> in guineapigs
Raw milk from individual herds	1,311	66 (5 per cent.)
Bulked raw milk	136	52 (38.2 per cent.)
Pasteurized milk	110	6 (5.5 per cent.)

CF antibodies for *R. burneti* were present at a titre of 1 in 16 or greater in 52 (2.7 per cent.) out of 1,954 sheep sera from flocks in Glamorgan and Monmouthshire, and in 49 (4.1 per cent.) out of 1,202 human sera from blood donors in the areas covered by the survey of cows' milk and sheep sera.

In spite of the wide distribution of *R. burneti* shown by these results, clinically recognizable cases of Q fever are uncommon; thus, only 15 (0.6 per cent.) of 2,482 consecutive cases of non-bacterial pneumonia from the area under consideration appeared to be caused by *R. burneti* [see also MARMION *et al.*, this *Bulletin*, 1954, v. 51, 907].

R. S. F. Hennessey

GABURRO, D. & DEL CAMPO, A. Considerazioni epidemiologiche e cliniche su un'infezione da *Coxiella burneti* in tre gemelle immature. [**Epidemiological and Clinical Findings in Q Fever in Immature Triplets**] *Giorn. di Malattie Infettive e Parassit.* 1956, Aug., v. 8, No. 8, 384-9. 5 figs.

The triplets were premature (7 months) at birth. Within a few weeks all developed febrile illness and were found to have opacities in the lungs on X-ray examination. The complement-fixation test with *Rickettsia burneti* was positive 1 in 16 in one, and 1 in 8 in one, but the third infant was negative. *R. burneti* was isolated from the first infant, who died; the others recovered. The test was positive 1 in 64 in the mother and 1 in 32 in the father.

The family occupied an apartment close to a large field where flocks of sheep were put out to graze when on the way to alpine pastures. Two shepherds had positive complement-fixation tests at 1 in 32 and 1 in 4 respectively, but the authors do not admit the validity of tests positive at less than 1 in 16. They think that the infants probably acquired the infection by inhalation of infected material originating from the flocks of sheep.

Charles Wilcocks

SNODGRASS, P. J. **Endemic Q Fever in South Texas.** *U.S. Armed Forces Med. J.* 1956, Oct., v. 7, No. 10, 1457-64, 2 figs. [24 refs.]

“ During an 18-month period (1954–1955) 15 patients with serologically proven Q fever and 18 otherwise identical patients with Q fever were admitted to the dispensary at this air station. A review of their signs, symptoms, and laboratory and roentgenographic findings reveals a distinctive clinical picture. The epidemiology of Q fever is reviewed in light of recent advances reported in the literature.”

SALVERAGLIO, F. J., BACIGALUPI, J. C., SRULEVICH, S. & VIERA, O.
Investigación de la fiebre Q en el Uruguay. Informe preliminar.
[Investigation of Q Fever in Uruguay] *Hoja Tisiológica*. Montevideo. 1956, June, v. 16, No. 2, 104–17, 3 figs. [28 refs.] English summary 197–8.

The authors describe a case of Q fever which they studied in a hospital in Montevideo, Uruguay. No case of the disease has previously been reported from this country. The diagnosis was confirmed by complement-fixation and rickettsia-agglutination tests which were positive at rising titres, the former reaching a maximum of 1 in 256 and the latter a maximum of 1 in 64. The patient was a worker in a meat-packing establishment.

Among 12 other acutely ill patients in the hospital 3 gave positive reactions with both tests at low titres but none of them was suffering from Q fever; two of them were dairymen and one was a butcher.

Sera of 25 slaughter-house workers were tested; 2 of them gave positive reactions with the complement-fixation test at a titre of 1 in 16; these 2 and 3 others reacted with the agglutination test in which undiluted serum was used. None of the sera of 99 unselected persons in Montevideo gave positive fixation reactions at titres of 1 in 16.

Among 48 sera from cattle at the local packing station 4 gave positive reactions with the agglutination test in which undiluted serum was used. Among 90 other sera of cattle at the same place 12 reacted with the agglutination test with undiluted serum and 8 of these reacted also with the complement-fixation test at a titre of 1 in 16.

The agglutination test was of the capillary-tube type described by LUOTO [this *Bulletin*, 1954, v. 51, 166]. This was found very satisfactory, being simple, specific and more sensitive, when carried out with undiluted serum, than the complement-fixation test at a titre of 1 in 16.

The introduction to the paper consists of an admirably clear and concise description of Q fever.

John W. D. Megaw

DE MAGALHÃES, O. Contribuição para o conhecimento das doenças do grupo tifo exantemático do Brasil. [Observation relating to the Typhus Group of Fevers in Brazil] *Mem. Inst. Oswaldo Cruz*. 1955, June–Sept.–Dec., v. 53, Nos. 2, 3 & 4, 293–300, 4 graphs (1 coloured). [15 refs.]

The English summary appended to the paper is as follows:—

“In this work the author publishes an observation of a human case, which he believes to be the second in South America, of ‘Q’ fever in Minas Gerais.

“The first positive data and the first observation were made in S. Paulo by Dr. Helvecio Brandão and there communicated to the S. Paulo Medical Association in 1951 and 1954. The first part was published in 1953; the second part is yet unpublished.

“The author of the present work cured his patient with Terramycin. He thinks that greater research should be made amongst the workpeople who have to do with cattle in the pastures and slaughterhouses in order to verify the extent of the disease amongst us.”

WEISS, E. & PIETRYK, Helen C. **Growth of *Coxiella burnetii* in Monolayer Cultures of Chick Embryo Entodermal Cells.** *J. Bacteriology*. 1956, Aug., v. 72, No. 2, 235–41, 2 figs.

“Monolayer cultures of entodermal cells derived from the avascular membrane of the 4-day-old chick embryo were used for the study of the growth of *Coxiella burnetii* and for the development of a quantitative method of assay. The organisms were readily recognized in stained cultures beginning on the fourth day after inoculation, developed in the cytoplasm of their host cells, slowly invaded neighboring cells, and, provided the concentration of the inoculum was small, formed discrete foci of infection between the fifth and tenth days. Enumeration of the foci of infection yielded consistent results and a titer for the inoculum which corresponded to the tissue culture ID_{50} . It was intermediate between the chick embryo LD_{50} and ID_{50} . Recent explantation of the cells, a high host-nutrient ratio, and the presence of host cell constituents, all tended to enhance infection. The focus count method of quantitation appeared to be well suited for a study of the factors that favored adsorption of the rickettsiae to host cells and that favored their growth.”

Roux, J. Le pouvoir pathogène de *Rickettsia burnetii* pour le Cobaye: Variations expérimentales. [**Experimental Evidence of Variation in Pathogenic Power of *Rickettsia burnetii* for Guinea-pigs**] *C.R. Soc. Biol.* 1956, v. 150, No. 4, 782–4.

The following is a translation of the author's summary:—

A strain of *Rickettsia burnetii*, normally feebly pathogenic for guinea-pigs, suddenly became highly pathogenic, rapidly killing all the animals with signs of encephalitis or keratitis. *R. burnetii* was recovered from the brain, the optic nerve and the eye. These findings underline once more the very variable character of the pathogenic power of rickettsiae.

H. J. O'D. Burke-Gaffney

SYRŮČEK, L. & SOBĚSLAVSKÝ, O. Experimentální infekce potkana (*Rattus norvegicus*) *C. burneti*. [**Experimental Infection in Rats** (*Rattus norvegicus*) **with** *C. burneti*] Českoslov. Epidemiol., Mikrobiol., Imunol. Prague. 1956, v. 5, No. 5, 251-4. [14 refs.]

The English summary appended to the paper is as follows:—

“To prove the facts given in the literature describing cases of Q fever infection in rodents and to find first of all the time of excretion of *C. burneti* in urine and excrements we made several tests with rats (*Rattus norvegicus*).

“It was found that the time of excretion of *C. burneti* in urine and excrements of rats (*Rattus norvegicus*) is approximately from 13 to 38 days after the experimental infection.

“Other tests being made at the same time brought the following results. Rickettsiemia is approximately from 7 to 26 days after infection, complement-fixing antibodies appear in the second week after the experimental infection.

“During the time of the disease being in progress there were no symptoms to be seen in test animals.

“What we have found makes us believe that (*Rattus norvegicus*) are one of the potential links in the epidemiological and epizootological process in Q fever.”

LUDWIG, H. Q-Fieber-Hepatitis. [**Q Fever Hepatitis**] *Schweiz. med. Woch.* 1956, Sept. 15, v. 86, No. 37, Suppl., 1052-4.

The following is a translation of the author's summary:—

Two cases of Q fever are described which clinically presented the features of hepatitis. Fifteen other cases were found in the literature.

H. J. O'D. Burke-Gaffney

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

O'GOWER, A. K. **Control Measures for *Aedes aegypti*. Surveys in Northern Australia.** *Health.* Canberra. 1956, June, v. 6, No. 2, 40-42, 1 map.

Australia is a “yellow-fever receptive area” as defined in the International Sanitary Regulations adopted by WHO, and so it is necessary to eliminate *Aedes aegypti* from its airports and seaports. The author made larval surveys in 1953 in Darwin which has a reticulated water supply, and in Broome which depends on rain-water storage tanks. Some

observations were also made in Townsville in 1954: Townsville also possessed rain-water tanks in nearly every house, but has since acquired a reticulated system.

Before Darwin obtained a reticulated supply during the war *Aedes aegypti* were abundant: in 1950, the species was only recorded twice (during the course of an anopheline survey). In 1953, no larvae were found in 124 habitations although a quarter of them yielded larvae of other species, including *Culex fatigans*.

In Broome, *Aedes aegypti* were found in 21 of 28 habitations, breeding in the usual wide variety of receptacles: the *Aedes aegypti* index was thus 75 per cent. In all but one of the habitations mosquito larvae of some kind were found. All of 15 habitations in Townsville showed adult *A. aegypti*, so that a larval survey would be expected to show a high index.

The value of completely replacing rain-water storage tanks by a reticulated water supply in the control of *Aedes aegypti* is well illustrated in these findings. No doubt Townsville will show evidence of regression of *A. aegypti* as the water tanks are gradually eliminated.

A valuable feature of the paper is a map indicating distribution of *A. aegypti* in Australia, so far as it is known: most of the records on which the map is based are the result of intensive mosquito collecting since 1942, but some of them are older. H. J. O'D. Burke-Gaffney

SEVERO, O. P. La erradicación del *Aedes aegypti* en las Américas. [Eradication of the *Aedes aegypti* Mosquito from the Americas] *Bol. Oficina Sanitaria Panamericana*. 1956, June, v. 40, No. 6, 485-98, 1 map & 2 charts. [14 refs.] English summary.

This paper gives substantially the same information as Severo (*Bol. Oficina Sanitaria Panamericana*, 1955, v. 38, 378 [see also this *Bulletin*, 1956, v. 53, 1334]); it adds data on the state of campaigns in different countries up to 1955.

DENGUE AND ALLIED FEVERS

SMITH, C. E. G. A Localized Outbreak of Dengue Fever in Kuala Lumpur: Epidemiological and Clinical Aspects. *Med. J. Malaya*. 1956, June, v. 10, No. 4, 289-303, 6 figs. [18 refs.]

This paper summarizes investigations of an outbreak of dengue fever which affected some 40 people living near a large day-school at Kuala Lumpur. Cases occurred from 4th March to 1st April 1954, all coming from 7 buildings within a $\frac{1}{4}$ -mile radius. There was no evidence of spread of the disease to day-pupils attending the school, or of any increased

incidence of recognizable dengue in Kuala Lumpur itself. It is thought probable that *Aedes aegypti* was the main vector and that *Aedes albopictus* and *Culex fatigans* may also have been concerned in transmission, these 3 species being found in houses in the affected area. Clinical data for 31 cases are briefly analysed, and trends of antibody levels in sera taken at intervals up to 30 weeks after infection are discussed. Three strains of dengue virus (one identified as Type I) were recovered from the blood of patients involved in the outbreak; the virus had not previously been isolated in Malaya.

[The author states that "... no outbreak, virologically proven to be dengue, affecting the local population in an area where dengue is endemic, has been previously studied from so many aspects". The main epidemiological and clinical features are given briefly in this account, which could not be termed comprehensive. Papers on laboratory investigations are to follow.]

R. S. F. Hennessey

ANDERSON, C. R., AITKEN, T. H. G. & DOWNS, W. G. **The Isolation of Ilhéus Virus from Wild Caught Forest Mosquitoes in Trinidad.** *Amer. J. Trop. Med. & Hyg.* 1956, July, v. 5, No. 4, 621-5.

Two strains of a virus identified by cross-neutralization tests as Ilhéus virus were recovered from young mice inoculated intracerebrally with material from forest mosquitoes captured in Trinidad in 1954. The first strain was derived from a pool of 75 mosquitoes representing 8 genera and including 22 *Psorophora ferox*, 6 *P. albipes* and 31 *Aedes* of 4 species; the second strain was isolated from a pool of 143 mosquitoes, consisting of 89 *P. ferox*, 2 *P. albipes* and 52 *P. cingulata*. The strains were adapted to adult mice, the incubation period decreasing to 4 days on continued passage. Both strains produced a haemagglutinating antigen similar to that of the original Ilhéus strain.

In an addendum the isolation of 4 more strains of Ilhéus virus from pools of Trinidad mosquitoes collected in a forest in 1955 and 1956 is reported. Two pools contained "reasonably large numbers of *Aedes* and *Psorophora* species", one contained 30 *Aedes serratus* and 1 *P. lutzi* and one contained 7 *P. ferox*.

The isolations now recorded are the first since the original strain of Ilhéus virus was recovered from a pool of *Aedes-Psorophora* mosquitoes in Brazil in 1946.

R. S. F. Hennessey

DOWNS, W. G., ANDERSON, C. R. & THEILER, M. **Neutralizing Antibodies against Certain Viruses in the Sera of Residents of Trinidad, B.W.I.** *Amer. J. Trop. Med. & Hyg.* 1956, July, v. 5, No. 4, 626-41, 2 figs. [17 refs.]

Sera collected in 1953 and 1954 from 1,055 residents of Trinidad were subjected to 4,555 protection tests with 17 different viruses which were

known or believed to be arthropod-borne. Tests on 815 sera gave single positive results in 4.7, 22.8 and 9.3 per cent. against yellow fever, dengue I and Ilhéus viruses respectively; 111 sera were positive to more than one of these viruses. The distribution of immunity for Ilhéus virus suggests that the infection is acquired in forest areas, while the rates for dengue virus were higher in rural than in urban areas (45.8 per cent. as against 15.2 per cent.). Sera from persons under 15 years of age in rural areas were all negative with yellow fever virus; the 15-19-year age-group had an immunity rate of 8.0 per cent., the rate rising to 49.6 per cent. in persons aged 50 years and over. Positive neutralization tests against Venezuelan equine encephalitis virus were given by 11 sera (all from persons over 15 years of age) out of 160, and 15 out of 348 sera were positive against St. Louis encephalitis virus. The significance of a few positive reactions with other viruses is not clear.

A provisional ecological zoning of the island was attempted, based on the distribution of immunity to Ilhéus, dengue and yellow fever viruses. Zones defined by climatic, vegetational and physical features seemed to accord well with the immunological data. *R. S. F. Hennessey*

RABIES

STARKE, G. Beitrag zur Epidemiologie und Bekämpfung der Tollwut in der DDR. [**The Epidemiology and Control of Rabies in the East German Republic**] *Ztschr. f. ärztl. Fortbildung*. 1956, Aug. 15, v. 50, No. 16, 687-97, 1 fig.

In this paper from the Government Institute of Anti-Rabies Inoculation in Potsdam, the author prefaces his account of the epidemiology and control of rabies in the East German Republic by a description of the many species of animals that may be infected by rabies and reference to the history of epizootics in Germany which are known to have occurred in 1803, 1837-41, 1865-66 and 1863-71 in various parts of the country. With the beginning of the Second World War an increase in the number of rabies infections in wild animals was observed in Germany and Austria. The increase continued and a description with figures, tables and a map is given of the spread of the infection to almost all parts of the country. The numbers of proved infections in wild, domestic and farm animals through the years 1947-55 are given. A table states the number of human beings known to have been injured by infected animals and the number of human deaths from rabies in the individual years 1947-55, *e.g.*: 15 people injured in 1947 (no deaths), 521 in 1950 (13 deaths), 938 in 1951 (5 deaths) and 685 in 1955 (2 deaths). Transmission of infection to man from animals, among which the dog is the most important, is fully discussed, together with the difficulties of control or capture of possibly infected animals.

The prevention of rabies is discussed at some length. Before the development of specific inoculation by Pasteur, the only method of prevention was the cauterization of the local injury by means of strong hydrochloric or nitric acids, silver nitrate and burning. Such treatment, although it improved the prognosis, fell into disuse when inoculation came into favour. It is now realized that inoculation methods are not 100 per cent. effective and reported experience such as that from Yugoslavia of 27 per cent. of deaths from rabies in persons inoculated after being bitten by infected wolves led to the recommendation by the Rabies Commission of the World Health Organization that energetic local treatment should be given as well as the inoculations. Some results of experiments on guinea-pigs are given to demonstrate the real preventive value of local treatment with a 20 per cent. soap solution or of a 3 per cent. solution of Hydramon (a quaternary ammonium compound). The methods of inoculation of Semple and of Hempt are described with some account of the new Flury vaccine, the need for further work to assess its real value and the possibility of combining its injection with administration of a hyperimmune serum.

M. E. Delafield

REMLINGER, P. & HADJI, A. Contribution à l'étude du virus Flury. 3^e Mémoire. [**Contribution to the Study of the Flury Virus**] *Arch. Inst. Pasteur d'Algérie*. 1956, June, v. 34, No. 2, 198-9.

Between 1952 and 1956 investigations into the nature of the Flury strain of rabies virus were pursued at the Pasteur Institute, Tangier. During this period the virus employed was maintained in the guinea-pig by brain-to-brain passage, early experiments having shown the rabbit to be but little susceptible to intracerebral inoculation with this virus. The present article provides the results of 4 series of experiments carried out, during successive years, on groups of rabbits inoculated intracerebrally with this passaged virus.

In the first series (1952-53) 50 rabbits were employed and of that number 25 resisted infection, 20 developed epileptiform attacks, mostly of a benign character, and 5 succumbed to rabies, 3 with paralytic manifestations. In the second series (1953-54), comprising 40 rabbits, 5 remained unaffected, 20 showed epileptiform attacks and 15 succumbed to rabies, some with paralytic, but none with paralytic signs. In the third series (1955) 21 rabbits were inoculated and of these 2 remained without symptoms, 19 had epileptiform attacks and one developed paralytic signs. In the fourth, and final series (1956), comprising 15 rabbits, 2 showed no symptoms. The remaining 13 all developed epileptiform attacks which, beginning suddenly on the 7th, 8th or 9th day, were of frequent occurrence and of a very violent nature and led to the death of the animals mostly on the 2nd or 3rd day after onset; none of the 13 showed any signs of paralysis; later passage in the guinea-pig confirmed the rabic nature of the attacks. In this fourth series, while a greater susceptibility of the

rabbit to infection was apparent, the greater frequency and severity of epileptiform attacks, as well as the complete disappearance of the paralysis-provoking factor, showed the Flury strain to possess behaviour characteristics far removed from those of classical rabies virus. For the vaccination of animals the use of such a *virus exceptionnel* would, in the authors' view, be unlikely satisfactorily to replace the classical strains.

[The results of the first 3 series of experiments have already been referred to in this *Bulletin*, 1953, v. 50, 1037; 1954, v. 51, 169, 1241.]

G. Stuart

BURNS, K. F., FARINACCI, C. F., MURNANE, T. G. & SHELTON, Dorothy F.
Insectivorous Bats naturally infected with Rabies in Southwestern United States. *Amer. J. Pub. Health.* 1956, Sept., v. 46, No. 9, 1089-97. [13 refs.]

Since February 1954 a survey of bat fauna, for evidence of naturally acquired rabic infections, has been in progress in the south-western United States and in Mexico. The findings so far obtained from this survey and recorded in the present article are in respect of 1,247 bats, representing 9 species, collected from 14 localities in Texas, Arkansas, New Mexico and Louisiana and from 2 localities in Morelos and Vera Cruz in Mexico.

For the demonstration of a viral agent Swiss albino mice were inoculated intracerebrally with 20 per cent. brain or salivary gland suspensions, either from individual bats or from the pooled tissues of 5-7 bats, and were observed over a 21-day period. From the brains or salivary glands, or both, of 903 bats 32 strains of rabies virus were obtained. Identity of the virus was confirmed by serum-virus neutralization tests. In the initial mouse passage the incubation period varied between 6 and 16 days, the infected mice showing typical symptoms of viral encephalitis; subsequent serial passages were readily effected. Of the 32 strains isolated 28 derived from brain and 4 from salivary gland material. Virus was recovered from the following species: *Desmodus rotundus murinus*, vampire bats from Mexico; *Tadarida brasiliensis mexicana* from Texas and New Mexico, *T. brasiliensis cynocephala* from Louisiana, and *Myotis velifer incautus* from Texas—these 3 species being colonial insectivorous bats; *Antrozous pallidus pallidus* from El Paso, Texas and *Lasiurus borealis borealis* from San Antonio, Texas—these 2 species being free-living insectivorous bats. Direct microscopic examination of bat-brain impressions stained by Sellers's method was performed as a routine and in this connexion it is noteworthy that an extremely low percentage (approximately 17) of bat-brain tissues from which rabies virus was isolated proved to be positive for Negri bodies.

Antibody studies on sera obtained from 6 of the 9 species of bats collected were also carried out. Neutralization tests on the sera of 688 *T. brasiliensis mexicana* contained in 110 pools showed that 67 pools (61 per cent.) protected against 100 LD₅₀ of the standard challenge virus

(CVS fixed strain of rabies virus); 14 (74 per cent.) of 19 pools from 94 *T. brasiliensis cynocephala* exhibited rabies virus-neutralizing substances; and of 29 pools from 162 *M. velifer incautus* 7 (24 per cent.) were positive. These positive findings provided clear evidence of past experience with rabies virus. Rabies neutralizing antibody was not observed in the sera of 10 *A. pallidus pallidus*, of 4 *L. borealis borealis*, or of 19 *D. rotundus murinus*. As regards this investigation it should be noted that, with the exception of 138 *T. brasiliensis mexicana*, which exhibited encephalitic manifestations, all the other 839 bats bled were apparently healthy.

To summarize the main findings indicated in this paper: (a) 2 species of colonial insectivorous bats (*T. brasiliensis cynocephala* and *M. velifer incautus*) collected in Louisiana and Texas, respectively, are the first to be reported from these States as being naturally infected with rabies; and 2 species of free-living insectivorous bats (*L. borealis borealis* and *A. pallidus pallidus*) collected in Texas are also shown to have been naturally infected with rabies; and (b) further evidence of latent and asymptomatic carriers of the virus of rabies in insectivorous bats in the states of Texas, Louisiana and New Mexico is presented. G. Stuart

REMLINGER, P. & HADJI, A. La disparition de la rage à Tanger. [**Disappearance of Rabies in Tangier**] *Arch. Inst. Pasteur d'Algérie*. 1956, June, v. 34, No. 2, 200.

Rabies seems to have been checked in Tangier as a result of control measures. In 1953-54, capture of stray dogs and vaccination of domestic dogs was carried out vigorously (278 in 1953 and 265 in 1954 were vaccinated). In 1955, these measures were intensified and some 1,640 animals were rounded up, and other methods were introduced such as making the issue of hunting permits subject to the vaccination of dogs. In that year, 284 dogs were vaccinated at the Pasteur Institute. Thereafter, human vaccinations against rabies fell from 110 to 37 and no new treatments have been undertaken since December 1953.

The author points out, however, that only those persons were treated in whom there was a definite indication, and that if the position is to be maintained precautions should not be relaxed: in several countries, relaxation of control measures has resulted in a return of the disease.

There was only one case of rat-bite treated for rabies in 1955 and it would seem that disappearance of the disease in rats [this *Bulletin*, 1952, v. 49, 945] was related to its disappearance in dogs, which transmit it to rats. H. J. O'D. Burke-Gaffney

POUL, J. & RAMPON, R. Vaccination antirabique par voie intradermique. [**Anti-Rabies Vaccination by the Intradermal Route**] *Arch. Inst. Pasteur d'Algérie*. 1956, June, v. 34, No. 2, 201-4.

The object of the experiments described in this article was to determine by modern methods of calculation the protective value of anti-rabies

vaccine administered to dogs by the intradermal route. For the purpose of this evaluation 2 different types of vaccine were employed, each containing as antigen the Paris strain of fixed rabies virus in 14 per cent. brain suspensions: one, a killed, formolized virus vaccine, and the other, a live virus vaccine.

In the first experiment 25 dogs received, each daily on 15 consecutive days, 0.5 cc. of the formolized vaccine. Eight of the animals died of intercurrent affections and several showed severe local reactions. The remaining 17 were challenged intracerebrally, 38 days after the last injection, with fixed virus derived from rabbit brain infected with the Tangier strain; at the same time titration of the challenge virus was carried out on 25 dogs serving as controls. Results showed the log. of the 50 per cent. end point in the vaccinated animals to be 3.25, that in the controls 4.68. The logarithm of the index of protection afforded by the vaccine was, therefore, 1.43.

In the second experiment 25 dogs each received 2 doses, separated by a 21-day interval, of 0.5 cc. of the live virus vaccine. None of the animals contracted rabies as a result of the injections, none showed any serious local reactions, but 3 died of intercurrent disease. The surviving 22 were subjected 27 days after the last injection to intracerebral challenge with Tangier fixed virus, this challenge virus being at the same time intracerebrally titrated in 25 dogs serving as controls. Results showed the log. of the 50 per cent. end point in the vaccinated animals to be 2.85, that in the controls 4.83. The logarithm of the index of protection afforded by the vaccine was, therefore, 1.98.

These results confirm those obtained by previous workers: dogs can be satisfactorily immunized against rabies by the intradermal administration of either an antigen killed by formol or a live virus vaccine; moreover the quantity of live virus vaccine required to confer protection is one-seventh of that of the formolized vaccine, and with the former, in this comparatively small dosage, a greater degree of protection is achieved. Despite their immunizing properties neither vaccine can, however, be usefully employed for canine prophylaxis: the live virus vaccine because of its inherent dangers, and the formolized vaccine because of the number of injections required and the likelihood of serious local reactions resulting from them. Further, the administration of vaccine by the intradermal route is obviously unsuitable for the mass vaccination of dogs.

G. Stuart

CREAMER, A. A. & BROWN, A. L. **A Simple Device for holding Animal Heads during Rabies Examination.** *Bull. World Health Organization.* Geneva. 1956, v. 14, No. 4, 805-6, 2 figs.

This very simple and inexpensive device, which is illustrated in 2 photographs, consists of a door-hinge screwed to a wooden board

(2" × 6") and locked by means of a bolt with a wing nut placed through its outer screw-holes. The board may, if desired, be bolted to a table.

When the animal's brain is to be removed, the mandible is clamped to the board; if the submaxillary gland is to be excised, the maxilla is similarly clamped. In either case, the operator's movements are not impeded as the hinge is out of the way. Thus the whole operation may be performed by one person. *H. J. O'D. Burke-Gaffney*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

SAGAR, P., AGARWALA, S. C. & SHRIVASTAVA, D. L. **Studies in the Enzyme Make Up of *Pasteurella pestis*. Part I. Deamination of Amino Acids by Virulent and Avirulent Strains.** *Indian J. Med. Res.* 1956, July, v. 44, No. 3, 385–92, 3 graphs. [16 refs.]

The deaminase activity of virulent and avirulent strains of *Pasteurella pestis* was measured in terms of ammonia liberated from various amino-acids on incubation with washed bacterial suspensions, ammonia being estimated by direct Nesslerization. Of 20 amino-acids used as substrates, only serine, glycine, asparagine and cysteine were deaminated to an appreciable extent [in a footnote it is stated that the ammonia liberated from asparagine was probably due to hydrolysis]. Virulent and avirulent strains tested with these 4 amino-acids showed no regular differences in deaminase activity. Ammonia liberation was consistently maximal with DL-serine. The optimum temperature and pH for deaminase reactions were found to be 37.5°C. and 7.0 respectively. *R. S. F. Hennessey*

KARTMAN, L., PRINCE, F. M. & QUAN, S. F. **Studies on *Pasteurella pestis* in Fleas. Comparative Plague-Vector Efficiency of *Xenopsylla vexabilis hawaiiensis* and *Xenopsylla cheopis*.** *Bull. World Health Organization.* Geneva. 1956, v. 14, No. 4, 681–704, 1 pl. & 5 figs. [28 refs.]

A comparison between the 2 represented species of *Xenopsylla* in the Hawaiian Islands was made on the basis of their respective efficiencies as vectors of a virulent Hawaiian strain (S 113) of *Pasteurella pestis*. Notes are given on the origin and occurrence of the 2 fleas named.

In determining vector efficiency, the concept of WHEELER and DOUGLAS [see this *Bulletin*, 1946, v. 43, 35] was modified as follows: (1) infection potential was based upon the percentage of fleas proved positive after

death, and not upon positive infection of the faeces; (2) vector potential was determined as the percentage of fleas with *permanent* proventricular blocks; in addition, a new component, the blocking-survival potential, was postulated for greater evaluation of factors affecting the vector index.

Results indicated that blocking occurred sooner in males than in females, and in *X. v. hawaiiensis* than in *X. cheopis*, but that more of the latter species became blocked. Mean times for blocking (incubation period) were: *X. v. hawaiiensis* males 14.5 days, females 22.4 days; *X. cheopis* males 20.3 days, females 30.9 days. In both species, plague masses were initially observed most frequently 3 to 5 days after infection in the ventriculus rather than in the proventriculus; but after 10 to 12 days, proventricular masses predominated, especially in the males of both species.

Summary numerical values for *X. v. hawaiiensis* and *X. cheopis* were: infection potential 0.85 and 0.96, blocking (vector) potential, 0.86 and 0.79, transmission potential 0.45 and 0.91, vector efficiency 0.33 and 0.69, respectively. Hence, *X. cheopis* was about twice as efficient a vector as *X. v. hawaiiensis*. Transmission by fleas without proventricular blocks was rare, and did not result at all from fleas with partial blocks; moreover, many fully blocked fleas did not transmit, but no correlation with the duration of feeding was apparent in this connexion.

The mean day of death of mice after infection was 4.0 (range 2 to 8 days), and time and percentage mortality curves from flea-transmitted infections were similar to those resulting from intracutaneous inoculation of known dosages of *P. pestis*. Mean values for survival of fleas after blockage (previously mentioned as blocking-survival potential) were *X. v. hawaiiensis* males 3.4 days, females 3.3 days; *X. cheopis* males 3.9 days, females 3.0 days.

Bacteriological culture of flea faeces showed that this method is not a reliable criterion in determining infection with *P. pestis*. Similarly, apparent absence of plague masses did not necessarily indicate freedom from infection.

N. R. Phillips

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BHASKARAN, K. & ROWLEY, D. **Nutritional Studies on *Vibrio cholerae*.** *J. General Microbiol.* 1956, Oct., v. 15, No. 2, 417–22.

“One hundred and fifty-eight strains of vibrio, predominantly *Vibrio cholerae*, were tested for their nutritional requirements. Half of the strains were able to grow on a simple inorganic medium with ammonium ions as the sole source of nitrogen; the other strains required purines in

addition. The simplest purine which produced adequate growth was hypoxanthine. The purine-requiring strains were able to grow on inorganic media containing human, rabbit or goat serum, but not on the serum from mouse, rat, guinea pig or horse."

POLLITZER, R. **Cholera Studies. 7. Practical Laboratory Diagnosis.** *Bull. World Health Organization.* Geneva. 1956, v. 14, No. 4, 705-93. [Numerous refs.]

This seventh part of the Monograph deals very fully with the laboratory examinations applicable to the diagnosis of cholera and also the methods which may be used for isolation of *V. cholerae* from water. The tests for identification of the vibrio, the principles of which had been discussed in previous sections, are brought together and their value indicated.

Stool examinations. The methods for collection and preservation of specimens are first reviewed.

Preservation methods. The procedures which have been found effective in preserving the vibrio in stools have been based on the favourable action of suitable salt concentration along with the ability of *V. cholerae* to survive at high alkalinity. For the purpose VENKATRAMAN and RAMAKRISHNAN devised a medium consisting of a boric acid buffer solution at pH 9.2 to which 2 per cent. sea-salt was added. When a small quantity of cholera stool is added to this the vibrio can be recovered up to 2 months or more later, other organisms having been largely suppressed. The method has been found satisfactory for the examination of pooled specimens from suspected cholera carriers.

Culture by enrichment methods. For the isolation of the vibrio from stools the value of preliminary enrichment was early realized, the first method employed being inoculation into a weakly alkaline solution containing 1 per cent. peptone and 0.5 per cent. sodium chloride. Minor alterations in the medium were employed with varying success. Later more highly selective liquid media were introduced, an important one being READ's modification of WILSON and BLAIR's bismuth sulphate medium. WILSON and REILLY proposed further modifications in composition and the method has been found to be highly selective for vibrios, especially those, such as *V. cholerae*, which are mannose-fermenters. Details of the method of preparation are given. An entirely different method of differential isolation was introduced by PANJA. This consisted of placing a sample of suspected cholera stool inside an L3 candle fitted inside a test-tube containing peptone water to which boric acid had been added in a concentration of 0.08 per cent. The vibrios were found to grow through the candle after 24 to 48 hours' incubation. The method although effective presents certain practical difficulties. Potassium tellurite media have been used with some success, suppressing the growth of coliform and other organisms.

Cultivation on solid media. A number of different selective media are described which have been used either for direct plating or for cultivation after enrichment. The first used on any considerable scale was Dieudonné's alkaline blood-agar. When suitable precautions are taken in its manufacture and use, it has been found to give very satisfactory results. A number of modifications of the medium, such as KABESHIMA's in which haemoglobin is employed instead of blood, have been recommended. KRUMWIEDE *et al.* and also GOLDBERGER used an alkaline egg medium, and considered it to be more satisfactory. A modification of Endo's medium introduced by ARONSON has been widely used. The medium is made highly selective for vibrios by increasing its alkalinity to a fixed level and adding saccharose and dextrin as fermentable carbohydrates. Aronson's medium is considered to be highly reliable and was recommended for use in the instructions for cholera work issued by the British Ministry of Health in 1947. Details of the method of preparation are given. Media containing starch have been used by several workers who have claimed that vibrio colonies growing on it show characters which assist in their identification. Starch media however are not generally favoured. Casein-containing media have been employed but are considered to be more useful for cultivation of the vibrio for vaccine production than for diagnosis. Bile-salt media, including deoxycholate citrate agar have been widely employed and are favoured by some workers. A solid medium on similar lines to Watson and Reilly's bismuth sulphate liquid medium used for enrichment has been found to give highly differential growth suppressing coliform and aerogenes strains and unfavourable to the growth of many cholera-like vibrios. A modification of Wilson and Reilly's medium was recommended by PANDIT and by AHUJA and these different forms have been found very effective. The Wilson and Reilly medium has been found useful for direct plating without preliminary enrichment. It is for consideration whether very highly selective media are really essential if effective enrichment methods are first used.

Isolation from water. As direct plating of water samples is unlikely to result in the isolation of *V. cholerae* owing to the very small numbers likely to be present and the usual abundance of saprophytic organisms, various methods of enrichment have been employed. The earliest used was the addition of peptone and salt to the water to bring their concentrations to 1 per cent. and 0.5 per cent., respectively, with subsequent plating, after incubation, on alkaline agar or a special selective medium. TAYLOR and AHUJA successfully isolated vibrios from water by collecting 200 ml. quantities in screw-capped bottles to which 20 ml. of a solution of 10 per cent. peptone and 5 per cent. sodium chloride were added, the pH being raised to 9.0 with N/1 NaOH, thymol blue being the indicator. After incubation overnight 2 ml. amounts were added to 10 ml. quantities of peptone water and after 6 hours' incubation 1 drop was plated on Aronson's medium.

A marked advance in methods of isolation of vibrios from water was

made by Read, who filtered several litres of water through Kieselguhr-impregnated filter-paper, the paper being subsequently folded and placed in bismuth-sulphite enrichment medium and incubated. By this method *V. cholerae* could be isolated from samples which were negative by other methods. Variations of the method, with Seitz filter disks, have also been employed. PANJA and GHOSH used the filter candle method devised by Panja with success in isolating *V. cholerae* from the water of the Hoogly River at Calcutta. It is suggested that the method of choice for dealing with cholera-suspect water samples is to pass them through Kieselguhr-impregnated filters and to enrich these in a highly selective fluid medium.

Identification tests. The various reactions of *V. cholerae*, serological, biochemical and others, and their principles, have been dealt with in earlier sections of the Monograph. Here they are discussed from the point of view of their application in practical diagnosis.

Agglutination tests. It is recognized that the only fully reliable method for identification of the vibrio is the use of serological tests which will demonstrate the presence of the characteristic heat-stable O-antigen of *V. cholerae*. Along with this, haemolysis tests should be employed to eliminate the El Tor vibrio. The method to be used is an agglutination test with a pure O high titre serum against a living or formalized suspension of the vibrio and not the use of an H + O serum against a boiled suspension, it having been found that boiling reduces the O agglutinability of the vibrio. For the preparation of pure O sera suspensions of *V. cholerae* are used of which the H antigen has been destroyed by prolonged boiling. BRUCE-WHITE first prepared the antigen in a stable dried form which was found convenient and satisfactory to use. Sera are raised with the antigen, usually in rabbits, by a series of doses over a short period. The practice of different workers in preparing the high titre sera is detailed. The sera prepared against the O antigens of the Inaba and the Ogawa forms of the vibrio will contain agglutinins not only against the main antigen but also against the subsidiary antigens characteristic of the two forms. It is recommended that an undifferentiated serum should be used for ordinary routine diagnosis. Separate, type-specific sera, prepared by absorption may be used for epidemiological or other special studies. For example, an Inaba serum absorbed by an Ogawa suspension will identify Inaba strains.

The techniques which have been used by different workers in carrying out agglutination tests are described. In general, a preference for using living suspensions of the vibrio is indicated. GARDNER and VENKATRAMAN found that in contrast with organisms of the *Salmonella* group, formol did not inhibit the O agglutination of *V. cholerae*. Formol suspensions appear to be quite satisfactory and have been used by many workers. For preliminary diagnosis rapid slide agglutinations with O sera diluted 1 in 50 to 1 in 100 may be used but the results should be confirmed by tube agglutination. It has been recommended that the agglutination tubes should be placed in a water-bath at 52°C. and a preliminary reading made

at the end of 2 hours. A final reading should be made after the tubes have been standing overnight at room temperature.

For the recognition of rough or partially rough variants of *V. cholerae*, a high-titre serum prepared against a rough strain should be employed. Tests should be carried out with suspensions in 0.4 to 0.5 per cent. NaCl. Methods of applying Millon's reaction or the trypanflavine reaction are described and these may be used as confirmatory tests. Some strains, however, which react with rough sera may give negative reactions with the two tests.

Haemolysis tests. These have been discussed in detail in a previous part of the Monograph. The details are now given of a method of carrying out the haemolysis test which is recommended for use as standard.

Confirmatory tests.

The Cholera-red reaction. It was at first believed that the reaction was given solely by *V. cholerae* and that a diagnosis could be made by its use. Later it was found that it was given by many other vibrios including *V. metchnikovi* and some water strains. A negative reaction will help to rule out the cholera nature of a vibrio strain but falsely negative results may be obtained with true cholera strains unless the test is carried out with certain precautions. The medium used is important. It must be prepared from a brand of peptone which contains tryptophan, as this is necessary for the production of indole, and it must also have a suitable content of nitrates. A control with a known cholera-red-positive strain of *V. cholerae* is advisable.

Tests for Indole. These are of no differential value for diagnosis in cholera laboratory work. Many intestinal bacteria of other genera produce indole and cholera-like organisms, which are negative to nitroso-indole tests, give variable results when examined for indole production. A modified procedure for the test is given.

Carbohydrate tests. It is sufficient to carry out fermentation tests with only 3 sugars, namely saccharose, mannose and arabinose. HEIBERG found that all true cholera strains produced acid from saccharose and mannose but not from arabinose, and his finding has been amply confirmed by other workers. A vibrio which does not give these reactions is not *V. cholerae*, but as the same reactions are given by many other vibrios, the fermentation tests are not diagnostic.

The Voges-Proskauer reaction. This reaction as applied to the classical cholera vibrio, El Tor vibrios and cholera-like vibrios, has been fully dealt with in the third part of the studies. The test is negative with true *V. cholerae*.

Reference is made to the finding of TAYLOR, PANDIT and READ that a presumptive diagnosis of *V. cholerae* could be made on biochemical evidence alone if a vibrio gives the fermentations of Heiberg type I (production of acid from saccharose and mannose, but not from arabinose), and is cholera-red positive and negative to the modified Voges-Proskauer

test. A typical result of such combined tests will go a long way to support a presumptive diagnosis of cholera arrived at through rapid slide agglutination.

Appended is an annex containing a statement on methods for laboratory diagnosis of cholera prepared by an expert group for the third session of the Joint OIHP/WHO study group on cholera which met in India. This provides in readily accessible form an account of the methods specially recommended for the isolation and identification of *V. cholerae* and can be accepted as authoritative.

John Taylor

FRETER, R., with the technical assistance of D. HENTGES. **Experimental Enteric *Shigella* and *Vibrio* Infections in Mice and Guinea Pigs.** *J. Exper. Med.* 1956, Sept. 1, v. 104, No. 3, 411-18. [17 refs.]

Details are given of a method of infecting mice and guineapigs with a streptomycin-resistant strain of *Shigella flexneri* type 2a and a streptomycin-resistant strain of *Vibrio cholerae*. A broth culture of the organism was administered through a stomach tube 2 days after intragastric administration of erythromycin and streptomycin by the same method. Throughout the experiment these antibiotics with nystatin were supplied in the drinking water. If streptomycin was not given to inhibit the normal flora no shigellae or vibrios could be recovered from the faeces of orally infected animals; the other antibiotics were used to prevent superinfection with enterococci and fungi.

The infections thus produced were not fatal and were persistent. In some instances a dose of less than 1,000 organisms produced persistent infection, indicating that multiplication and true infection of the host had occurred.

Additional evidence that the normal flora is antagonistic to the new organism was provided by the failure of the shigella or vibrio to persist when a streptomycin-resistant *Bact. coli* was added to the infecting dose.

Immunization of mice by intraperitoneal inoculation of *Sh. flexneri* vaccine had no demonstrable effect on the establishment of the carrier state and intragastric administration of antiserum and complement 3 hours prior to infection was equally inactive. It is felt that in mice and guineapigs the antagonistic action of the normal flora of the intestine is the chief reason for the inability of *Shigella* and *Vibrio* strains to establish themselves in the gut.

J. Nagington

FRETER, R. **Coproantibody and Bacterial Antagonism as Protective Factors in Experimental Enteric Cholera.** *J. Exper. Med.* 1956, Sept. 1, v. 104, No. 3, 419-26.

Rapidly fatal infections with a streptomycin-resistant strain of *Vibrio cholerae* could be produced in fasting guineapigs by intragastric

inoculation with viable organisms according to a modification of the method described above.

Immunity comparable to that achieved by active immunization was obtained by intragastric administration of 2 ml. rabbit O-antiserum and 250 mgm. CaCO_3 3 hours prior to infection. It was most pronounced 24 hours after infection. The protective action conferred was not associated with any significant variation in the number of vibrios recoverable from the caecum in comparison with the number obtained from control animals.

Intraperitoneal injection of antiserum 30 minutes after infection had no demonstrable effect even though the serum agglutinin level rose until after 3 hours it was as high as in actively immunized animals.

Antibody had a protective action only if it were present in the lumen of the gut, which suggests that copro-antibody may be an important defence mechanism against enteric infection. In these experiments its action was probably more antitoxic than antibacterial.

J. Nagington

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

LEMAISTRE, C. A., SAPPENFIELD, R., CULBERTSON, C., CARTER, F. R. N., OFFUTT, A., BLACK, H. & BROOKE, M. M. **Studies of a Water-Borne Outbreak of Amebiasis, South Bend, Indiana. I. Epidemiological Aspects.** *Amer. J. Hyg.* 1956, July, v. 64, No. 1, 30–45, 2 figs. [10 refs.]

A previous article [this *Bulletin*, 1956, v. 53, 443] has dealt with the treatment of the cases in this the third water-borne outbreak of amoebiasis reported in the U.S.A. [*Bull. Hyg.*, 1934, v. 9, 178, 315; 1935, v. 10, 437]. The route of transmission was through a private water supply to a wood-working plant in which, during the outbreak, there were 31 clinical cases with 4 deaths [this *Bulletin*, 1955, v. 52, 777].

As a result of several severe amoebiasis infections among the employees an investigation was made into the source of infections. The distribution of clinical cases showed that a low and sporadic incidence during 2½ years was followed by a phase lasting 3 months in which there was a sharply increased incidence. The water supply had not been regarded with suspicion because it was chlorinated and routine bacteriological examinations were satisfactory. Investigation of food-handlers did not incriminate this source.

A single stool examination of 138 employees representing a 10 per cent. random sample revealed a 50·7 per cent. incidence of *Entamoeba*

histolytica infection as compared with a 4.4 per cent. incidence among 114 in a control plant. There was no concentration of infected persons in any particular section of the works and histories did not suggest any common source of infection other than the water supply which was derived from a drilled well and was chlorinated before being pumped into a receiving tank. Thence it was drawn by suction to the power house through an underground pipe and was distributed from a pressure tank to 5 buildings. Before chlorination had been introduced samples of the water from various points in the distribution system had shown coliform organisms although the well itself was always free of them. This suggested that contamination was introduced into the underground suction line which ran close and parallel to the sewer from the power house. Both pipes entered an oil separator manhole at which point there was a caulked lead joint on the water pipe which was half submerged in the pool of sewage in the manhole. It was proved by pressure and dye tests that there was a slight leakage into the suction line. One of the staff at the power house had suffered from severe recurrent attacks of diarrhoea and is presumed to have been the source of the outbreak. The fortuitous combination of several factors may have been responsible for the sporadic appearance of the earlier infections. The rapid increase in the third year would result from the establishment of a cycle of infection with an increased number of cyst carriers and consequent increased concentration of cysts in the sewage. Attention is drawn to the false sense of security afforded by chlorination which destroyed the bacteriological evidence of contamination without killing the cysts. [A number of interesting epidemiological points were established during this investigation but are omitted here for the sake of brevity.]

T. H. Davey

NAKAMURA, M. & BAKER, E. E. **Nutritional Requirements of *Entamoeba histolytica*.** *Amer. J. Hyg.* 1956, July, v. 64, No. 1, 12-22. [25 refs.]

Earlier reports have been made by KARLSSON *et al.* and by the present authors [this *Bulletin*, 1953, v. 50, 707; 1956, v. 53, 318] on the growth factors required by *Entamoeba histolytica*. The present communication describes extensions of these earlier investigations. The amoebae used were cultured on a diphasic medium plus rice powder with mixed bacterial flora. Growth factors were assayed by adding them to cultures rendered free of bacteria by penicillin and streptomycin; suitable controls were used. After the cultures were sealed with vaseline, incubation was carried out at 37°C. for 3-4 days and counts were then made of the number of amoebae present.

In the absence of bacteria, it was found that yeast dialysate, bacterial cells, frozen and thawed, or treated with ultraviolet rays, or autoclaved, stimulated growth of amoebae, whereas a number of liver and other preparations were without activity. These results are conveniently listed

in a table. In a second table the effect of components of nucleic acids on growth of *E. histolytica* under similar circumstances is shown. Enzymes and co-enzymes assayed for similar effect are also listed.

Vitamins such as pantetheine, ascorbic and folic acids and vitamin B12 were found to be essential to growth, while others such as PAB were not. Subculture in fresh tubes containing the growth factors alone was not possible. When adenosine triphosphate [ATP], diphosphopyridine nucleotide [DPN], ribose-5-phosphate or autoclaved bacterial cells were present in media, subculture for a limited number of times in absence of bacteria was possible; it was also possible when media consisting of a dialysate of medium in which bacteria had been grown were present along with nucleic acid components, vitamins and other named growth factors. On the other hand, *E. histolytica* cannot be cultured indefinitely in absence of living organisms. The growth factors which have been shown to be necessary for *E. histolytica* are conveniently given in the summary. and their function is discussed.

J. D. Fulton

LAMY, L. & MOLINARI, V. Étude de l'action *in vivo* de l'acétate de cortisone sur la phagocytose des amibes parasites. Comparaison avec les macrophages. [*In vivo Activity of Cortisone Acetate on Phagocytosis by Parasitic Amoebae, compared with that of Macrophages*] *C.R. Soc. Biol.* 1956, v. 150, No. 5, 936-8.

Discordant results have been obtained in the past by authors investigating the influence of cortisone or corticotrophin on phagocytosis. Some believe that these substances have a stimulatory effect on phagocytosis by macrophages, others have reported the reverse effect or complete absence of effect. The present authors have previously used the parasitic amoebae *Entamoeba invadens* and *E. histolytica* which are essentially phagotrophic, and resemble white cells in activity, to study the effect of cortisone acetate on phagocytosis *in vitro*.

For the present *in vivo* experiments vipers were experimentally infected with *E. invadens* and examination of amoebae for phagocytosis of administered starch was made in faecal material, prior to, or following administration of, various doses of cortisone. It was found that irrespective of the dose of the drug phagocytosis of starch grains or of intestinal bacteria by *E. invadens* was unaffected. Phagocytosis of starch was moreover actively pursued by host macrophages. These results agree with those obtained by the authors earlier *in vitro*.

J. D. Fulton

BUDDECKE, E., ESSELLIER, A. F. & MARTI, H. R. Über die chemische Natur der Charcot-Leydenschen Kristalle. [*The Chemical Nature of Charcot-Leyden Crystals*] *Hoppe-Seyler's Ztschr. physiol. Chem.* 1956, v. 305, Nos. 4/6, 203-6. [Refs. in footnotes.]

The English summary appended to the paper is as follows:—

“ Three specimens of Charcot-Leyden crystals have been examined and shown to consist of a zinc-containing polypeptide in which fourteen amino-acids were detected. No evidence was found for the presence of other types of compounds. The zinc content appears to be very much higher than the amount generally present in biological material.”

KASLIWAL, R. M. & BHATIA, M. L. **Liver Changes in Chronic Intestinal Amoebiasis.** *J. Indian Med. Ass.* 1956, Aug. 16, v. 27, No. 4, 127-9, 3 figs. on pl.

The authors discuss some aspects of the literature on liver changes in amoebiasis [this *Bulletin*, 1950, v. 47, 981; 1955, v. 52, 366; 1956, v. 53, 320] and then record the results of needle biopsy of the liver in 30 proved cases of chronic intestinal amoebiasis. The histological changes are described, and illustrated in 3 photomicrographs.

The normal architecture of the liver was generally maintained, but in 24 cases the hepatic cell plates were disorganized. In all but 4 cases, some diffuse parenchymal damage was seen. Areas of focal necrosis were seen in 21: the foci had no specific distribution in the lobule and varied in severity and number. Trophozoites could not be identified with certainty.

The commonest change seen was reticulo-endotheliosis (28 cases) which varied from a mild to a severe form. Portal infiltration was encountered in only 12 and was never very severe. In only one case was fibrosis seen, and this was limited to the portal area. Regeneration of liver cells was variable, the central veins were normal and no thrombosis was observed. In only 2 cases was fatty change seen, and this was insignificant in amount.

The authors state that these findings indicate that definite histopathological changes occur in the liver in chronic intestinal amoebiasis and suggest a subacute hepatic process. This “prehepatitis” stage may proceed to acute amoebic hepatitis or amoebic abscess. In heavy infections, or where liver damage due to malnutrition or other factors is already present, further necrosis may occur with eventual liver abscess.

Prompt response to treatment suggests that *E. histolytica* is in fact responsible for these liver changes, which morphologically appear to be reversible.

H. J. O'D. Burke-Gaffney

GORDON, G. **Amoebic Pericarditis: a Case Report.** *South African Med. J.* 1956, Sept. 8, v. 30, No. 36, 866-8, 2 figs.

In 2,000 autopsies (representing less than 10 per cent. of all deaths) at the King Edward VIII Hospital in Durban between 1950-55, there were

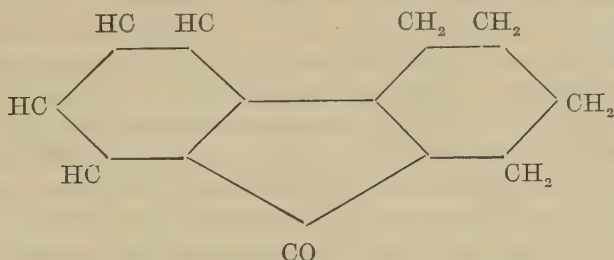
8 cases of suppurative amoebic pericarditis. The author gives a full case-history of one African patient who presented with an amoebic abscess of the left lobe of the liver and a pericardial friction-rub. The abscess subsequently ruptured into the pericardium.

Treatment by aspiration and anti-amoebic therapy resulted in recovery, which was still maintained when the patient was seen 2 months later.

H. J. O'D. Burke-Gaffney

STAM, A. B. & VAN THIEL, P. H. **The Amoebicidal Action in vitro of 1,2,3,4-Tetrahydro-9-Fluorenone (T.H.F.).** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, June, v. 8, No. 2, 171-4. [12 refs.]

The authors have tested 1,2,3,4-tetrahydro-9-fluorenone against *E. histolytica* and *E. invadens* in culture with mixed bacterial flora at



temperatures of 37°C. and 25°C., respectively, in diphasic medium. The drug was prepared as a saturated solution in Ringer's fluid giving a concentration of 1 in 15,000. The activity of emetine and oxytetracycline was compared with that of the above drug. When examination of the amoebae was made after 24 and 48 hours, staining with eosin was used as a test of viability. The results in a table indicate that the fluorenone was lethal at 1 in 15,000 concentration within 24 hours, but not at dilutions of 1 in 20,000 or 1 in 30,000. Further experiments indicated that death of *E. histolytica* and *E. invadens* occurred respectively within 20 minutes and 2 hours as a result of drug treatment at the upper concentration. The fluorenone derivative was found to be less active than emetine against *E. histolytica* but more active than oxytetracycline and more active than both against *E. invadens*.

The authors conclude [in the abstracter's view without justification] that clinical trials of the fluorenone are justified. [It appears to be carrying pruning to excess to write "*E. invadens* Rodh." and "*E. histolytica* Schaud." The use of eosin in examination of cultures for viability of amoebae appears to be unsatisfactory. The statement that Dobell examined the action of emetine against bacteria-free *E. histolytica* should be corrected to include a single bacterium (this *Bulletin*, 1948, v. 45, 518).]

J. D. Fulton

THORSON, R. E., SEIBOLD, H. R. & BAILEY, W. S. **Systemic Amebiasis with Distemper in a Dog.** *J. Amer. Vet. Med. Ass.* 1956, Oct. 1, v. 129, No. 7, 335-7, 1 fig.

"A case of concurrent systemic amebiasis and distemper in a dog is described. Organisms characteristic of *Entamoeba histolytica* were found in large numbers in the lungs, with pneumonia. Amebae also were seen in the liver, kidneys, and spleen. Tissue specimens of the intestines were not available for examination."

[See this *Bulletin*, 1954, v. 51, 1246.]

FLORIANI, C., CELLERINO, N. A. & CELLERINO, R. J. Nuevo compuesto para el tratamiento de la amebiasis. [**A New Compound for the Treatment of Amoebiasis**] *Semana Méd.* 1956, Sept. 6, v. 109, No. 12, 502-3.

Camoform has already been used in the treatment of amoebiasis [this *Bulletin*, 1955, v. 52, 156]. The present authors, in Argentina, used it in 32 patients with *Endolimax nana*, 4 with *Dientamoeba fragilis* and 1 with both infections. The dose was 3 tablets of 0.25 gm. each [presumably daily] for 8 days: 31 received a single course and 6 received a second course. After 15 days it was found that 30 of the patients were negative for the parasites: of the remaining 7, 4 became negative after a second course of treatment: after 3 months it was possible to follow up 10 patients and in only 1 patient were there trophozoites of *E. nana*. No patients showed any signs of intolerance to the drug.

H. J. O'D. Burke-Gaffney

BACIGALUPO, A. D'A. & VILLAMIL, C. F. La amodiaquina (Camoquin) en la giardiasis. [**Amodiaquine in Giardiasis**] *Rev. Asoc. Med. Argentina.* 1956, July 15-30, v. 70, Nos. 823/824, 207-10. [19 refs.]

The authors, in Argentina, treated 25 patients (11 of them children) suffering from giardiasis, with amodiaquine [see also this *Bulletin*, 1954, v. 51, 269, 1251]. Adults were given a single dose of 0.6 gm. and children received 0.2 to 0.4 gm. according to age. The dose was given half an hour before breakfast.

The results are discussed in great detail in the text and in a table. They show that in a parasitological follow-up of at least 3 weeks, and often longer, there were 11 failures, 2 probable failures, 9 probable reinfections and 3 successes. These findings did not correspond clearly with the clinical results. In 11 patients, intolerance to the drug occurred, possibly because they were fasting.

The authors consider that, in giardiasis, amodiaquine can be regarded as of value only in cases of absolute intolerance to acridine salts, which they regard as being quite specific [*ibid.*, 1939, v. 36, 605, 606].

H. J. O'D. Burke-Gaffney

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

GEIGY, R., MOOSER, H. & WEYER, F. Untersuchungen an Stämmen von afrikanischem Rückfallfieber aus Tanganyika. [**Studies on a Strain of African Relapsing Fever from Tanganyika**] *Acta Tropica*. Basle. 1956, v. 13, No. 3, 193-224, 6 figs.

The authors give a detailed account of a strain of *Spirochaeta duttoni* from Itete, Tanganyika, which had been kept at the Tropical Institute, Basle, exclusively in *Ornithodoros moubata* for 3 generations and found to have lost its original virulence for mice. A similar loss of virulence seems to have taken place in ticks found in the boarding school of the Catholic Mission in Itete, for in 1949 all the ticks examined had normal virulence for mice whereas in 1954 more than 90 per cent. had lost their virulence [see this *Bulletin*, 1956, v. 53, 196].

This strain, however, still retained its virulence for man and *Macacus rhesus*, although the clinical symptoms in the single volunteer and 5 monkeys infected were rather mild. Attempts were made to restore the virulence of the strain by passages in *O. moubata* and *Pediculus*, but with negative results. The non-virulent spirochaetes showed very limited growth in *Pediculus* not only when the lice were fed on infected monkeys but also when the organisms were injected into the haemocoel, or into the hind gut. On the contrary the spirochaetes virulent to mice multiplied abundantly in the haemocoel of infected lice. Animals inoculated with the non-virulent spirochaetes remained fully susceptible to the normal strain, and its virulence in mice was unaffected. *Edward Hindle*

RANQUE, J., DEPIEDS, R. & FAURE, A. Conservation de *Borrelia hispanica* en sérum dilué à 4° sans anaérobiose. [**Preservation of *Spirochaeta hispanica* in Diluted Serum at 4°C. without Anaerobiosis**] *C.R. Soc. Biol.* 1956, v. 150, No. 4, 745-6.

The following is a translation of the authors' summary:—

It seems that apart from the classical method of freezing, the easiest and best way of preserving the motility and virulence of *Spirochaeta hispanica* is to dilute the infected blood 1 in 8 in saline, separate the red cells by decanting or by low-speed centrifugation, and keep this diluted serum medium at 4°C. without anaerobiosis. *H. J. O'D. Burke-Gaffney*

YAWS AND OTHER TREPONEMATOSES

HACKETT, C. J. **The Control of Yaws.** *Roy. Soc. Promotion Health J.* 1956, Aug., v. 76, No. 8, 425-30. Discussion 430-31.

The author gives a valuable summary of the present position with regard to the control of yaws. The disease is only prevalent in under-developed countries, and methods of control, therefore, must be applicable in such environments and do not necessarily represent the theoretically ideal treatment for the individual. The immediate purpose of mass treatment campaigns is the rapid and complete elimination of infectious cases so that transmission ceases. Initial surveys and resurveys (which may be entrusted to simply-trained auxiliaries) at intervals of 6-12 months are required. In national campaigns in which WHO assistance has been sought, up to the end of 1955 50 million persons have been examined and 15 million patients treated. An essential ultimate requirement is the establishment of rural health centres.

The treatment policies are set out in the following table:—

Approximate prevalence of clinically active yaws in community	Approximate percentage of sero-reactors	4 ml. is given to all active cases of yaws and, in principle, 2 ml.* is given to:
High, over 10 per cent. HYPERENDEMIC	Over 60	the rest of the population as "latent cases and contacts" (TOTAL MASS TREATMENT, TMT)
Medium, 5-10 per cent. MESO-ENDEMIC	25	all children under puberty and obvious contacts of infectious cases (JUVENILE MASS TREATMENT, JMT)
Low, under 5 per cent. HYPO-ENDEMIC	under 10	all household and other obvious contacts of infectious cases (SELECTIVE MASS TREATMENT, SMT)

* These are the doses for persons aged 15 years or more. Persons under 15 years of age are given 2 ml. and 1 ml., respectively.

The drug is PAM (procaine benzyl penicillin in oil with 2 per cent. aluminium monostearate) containing 1.2 mega units per 4 ml.

It is recommended that clinical and serological sample surveys should be undertaken at intervals.

Frederick J. Wright

LÓPEZ NARVÁEZ, G. Pián y Campaña Antipiánica en Colombia. [**Yaws and Its Control in Colombia**] *Rev. Facul. de Med.* Bogotá. 1956, Apr., v. 24, No. 4, 294-342, 39 figs. & 1 map.

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

WARDEKAR, R. V. **Preliminary Report on the Data of the Control Units of the Gandhi Memorial Leprosy Foundation.** *Internat. J. Leprosy.* New Orleans. 1956, Jan.–Mar., v. 24, No. 1, 13–28.

This is a progress report of work begun in 1951 [see this *Bulletin*, 1953, v. 50, 521]. Ten leprosy control units have now been established. In locating these all over India variations in diet, customs, etc. have been represented. They are supervised regularly by a trained worker. Each unit covers an area of 3 to 5 miles' radius and a population of 15,000–26,000; it contains 2 or 3 clinics according to the population. The incidence of leprosy varies from 1 to 6 per cent.

Details are given of the unit at Sevagram, the first to be started and the centre from which the others are supervised. The area is surveyed and resurveyed, and an attempt is made to survey at least 90 to 95 per cent. of the population in each period of 2 years. At Sevagram in 1952 357 cases were detected and 213 registered at the clinic; in 1953 17 were detected and 89 registered; in 1954 125 were detected and 104 registered. This makes totals of 499 detected and 406 registered during the 3 years. Of the 499 detected cases 69 were lepromatous, and 430 non-lepromatous. Of the 406 registered cases bacteriological examination showed 16·5 per cent. to be infectious, and 83·5 per cent. to be non-infectious. From this it was calculated that of the total number detected 82 were infectious and 417 non-infectious. The question is discussed whether so few infectious cases could have infected so many non-infectious ones. "If it should be proved that negative cases are infective, that would be a further obstacle to control of leprosy by chemotherapy." Much stress is placed upon examination of contacts of registered patients. Out of 618 contacts of 191 patients 10 had leprosy, 5 of them being contacts of non-infective and non-lepromatous patients.

[This paper is worthy of careful study in the original.] *Ernest Muir*

UGARRIZA, R. G. Consideraciones sôbre el problema de la lepra en Paraguay. [**Discussion of the Leprosy Problem in Paraguay**] *Internat. J. Leprosy.* New Orleans. 1956, Jan.–Mar., v. 24, No. 1, 29–37, 2 figs. English summary.

Besides the 400 patients in the leprosarium of Santa Isabel there have been 1,590 known cases since 1947, of which 100 are in the capital. From findings among the troops it was calculated that there are probably some 5,000 in the country. Since a visit of the WHO representative in 1950 and 1954 efforts are being made to carry out a census of leprosy, to

standardize the treatment and to obtain the necessary specialists. There is a "preventorium" with 120 children.

Ernest Muir

ROTBURG, A. Simpósio sobre lepromino-reação e imunidade na lepra. 1933-1953. [**Symposium on the Lepromin Reaction and Immunity in Leprosy**] *Rev. Brasileira Leprologia*. S. Paulo. 1955, Jan.-Dec., v. 23. Nos. 1/4, 1-22. [99 refs.]

A very full review is given of the evolution of the lepromin test from the time when it was first introduced by MITSUDA about 1919 up to the present day. First the various methods of preparation and application of the antigen are described, and the relationship between the early and late readings of the reaction results. Then its significance in classifying cases of leprosy is discussed. It is noted that the reaction is negative at birth, increases in positivity with age in endemic regions, but is also positive in a high proportion of people in non-endemic countries.

Next the prognostic value of the lepromin reaction is considered, and this is followed by notes on the histopathology of the reacting skin. Various opinions are quoted regarding the fractions of the bacillus responsible for producing the reactions, early and late. Various parts of the skin surface react more vigorously to the lepromin antigen than others. The strength of the reaction is influenced by certain intercurrent diseases and by the season of the year. Seldom does a strongly positive reaction become negative, but a negative reaction may become positive. The specificity of the lepromin reaction is shown only when it is negative, as occurs almost invariably in lepromatous cases; in this respect *Myco. leprae* differs from other mycobacteria which give positive reactions when injected intradermally in lepromatous cases.

Ernest Muir

CONVIT, J. **An Investigation of Leprosy in the German Ethnic Group of Colonia Tovar in Venezuela. IV. Clinical Findings and Variations in the Mantoux and Mitsuda Reactions observed during Five Years after BCG Vaccination of Mitsuda-Negative Contacts.** *Internat. J. Leprosy*. New Orleans. 1956, Jan.-Mar., v. 24, No. 1, 38-44, 2 figs.

This paper deals with the 4th stage of an investigation into the clinical findings and changes in the Mantoux and Mitsuda reactions in 110 persons who were vaccinated with BCG in 1950. They all shared quarters with lepromatous patients, and thus were placed in great danger of infection. Before vaccination with BCG all gave negative Mitsuda reactions and 100 of them negative Mantoux reactions, but in none was there any sign of leprosy. Of the 106 examined 10 weeks after vaccination 93 had converted to positive Mitsuda reactions, 58 giving 1 plus, 21 giving 2 plus, and 14, 3 plus. The negatives and 1 plus reactors were revaccinated,

some twice, and at the end of June 1955 all were Mitsuda positive. The person who failed to come for vaccination in 1950 and who remained unvaccinated showed macular lepromatous leprosy in 1953, and 3 others showed incipient tuberculoid lesions though their Mitsuda reactions were strongly positive. Since 1953 there has been no new case of leprosy in the group. In the Mantoux tests made in 1953 the number of positives had risen to 46, but in 1955 it had fallen to 31 [indicating that in that period of time the positive conversion after BCG vaccination is more stable with the Mitsuda than with the Mantoux test]. Ernest Muir

SCHUJMAN, S. **Subsequent Evolution of the Induced Mitsuda Reaction in Clinically and Bacteriologically Negative Lepromatous Cases.** *Internat. J. Leprosy.* New Orleans. 1956, Jan.-Mar., v. 24, No. 1, 51-6, 8 figs. on pl. [10 refs.]

In 40 lepromatous cases which had become clinically and bacteriologically negative after several years of treatment vaccination was performed with Stefansky antigen in 13, with BCG orally in 19, and with BCG intradermally in 8 cases. In none of these was an early reaction induced, but there was a late reaction in 47 per cent. of those given oral BCG, in 50 per cent. of those injected with BCG, and in 69 per cent. of those receiving the Stefansky vaccine. These positives appeared 3 months after vaccination, but within 6 months they had again become negative. When they were revaccinated with their former vaccines they again became positive. It was found that after the 4th month few responded, and after the 5th month none responded. The induced lepromin reactivity in lepromatous cases has no protective value. Ernest Muir

LOWE, J. & MCFADZEAN, J. A. **Tuberculosis and Leprosy—Further Immunological Studies.** *Leprosy Review.* 1956, Oct., v. 27, No. 4, 140-47.

First a brief summary is given of former work suggesting the possibility of cross sensitivity between the mycobacteria of tuberculosis and leprosy. There is strong evidence that tuberculosis infection and vaccination with BCG sensitize a person to the leprosy bacillus, and the object of this paper is to discuss the possibility of the reverse process.

A group of 621 children in Nigeria were tested with PPD 5 Tuberculin Units and, if the reaction was less than 6 mm., they were tested again with 100 Tuberculin Units. At the same time they were tested for the lepromin reaction.

The results are shown in 3 tables. A statistically significant correlation was demonstrated between the lepromin and tuberculin reaction in the group investigated, but this could have resulted from simultaneous exposure of the population to tuberculosis and leprosy. However, the

tuberculin-positive rates appeared to be higher than could be explained by the incidence of tuberculosis in the area. The results with the tuberculin tests were similar to those obtained in India and Egypt where the non-specific factor is considered to operate, but were widely different from those recorded in Mexico and Denmark. No conclusion could be reached about whether or not the leprosy bacillus is a factor in producing a positive tuberculin test. [For previous work of which this is an extension, see this *Bulletin*, 1953, v. 50, 948.] Ernest Muir

SOUZA CAMPOS, N., ROSEMBERG, J. & AUN, J. N. *Correlação tuberculina-lepromina. [Correlation between Tuberculin and Lepromin Reactions]* *Rev. Brasileira Leprologia*. S. Paulo. 1955, Jan.-Dec., v. 23, Nos. 1/4, 23-40. English summary.

The authors first made tuberculin and lepromin tests in 3 groups of healthy people: (a) in a group of 471 children who had had no contact with leprosy; (b) in a group of 356 children who had been in contact with leprosy; (c) in a group of 860 adults who had had no known contact with leprosy. Three groups of patients were also examined: (1) 53 children with tuberculosis; (2) 73 adults with tuberculosis; (3) 105 patients with leprosy, 93 of whom had the lepromatous form of the disease.

It was found that there was agreement between the lepromin and tuberculin reactions to a considerable degree in healthy people who had been exposed to tuberculosis but not leprosy, in healthy persons who had been exposed to leprosy when they were first exposed to tuberculous infection, and in tuberculous patients. There was almost complete disagreement between the two reactions in lepromatous cases of leprosy when infected with tuberculosis. Persons vaccinated with BCG gave a high degree of agreement between the reactions, at least for a short time after vaccination. It is stated that those infected with leprosy, but with a positive lepromin reaction, will be permanently negative to tuberculin. [It is not clear on what grounds this last assertion is based.]

Ernest Muir

PEREIRA, M. J., JR. & NERY-GUIMARÃES, F. **Mitsuda's Reactions. Induced by BCG in the Normal Rhesus ("Macacca mulatta").** *Mem. Inst. Oswaldo Cruz*. 1955, June-Sept.-Dec., v. 53, Nos. 2, 3 & 4, 609-19, 2 figs. [10 refs.]

Living BCG vaccine was administered to 12 rhesus monkeys by various routes. Before the vaccination all the monkeys had negative tuberculin and lepromin reactions. In the monkeys which were given the vaccine into the peritoneum and the testicle the Mitsuda reaction was converted to 3 plus after 8 months and continued till 12 months. In those vaccinated orally, intradermally, by scarification and by multipuncture the conversion was only to 1 plus. In 5 other monkeys vaccinated orally

or intradermally with killed BCG vaccine conversions were slower and less marked. The tuberculin conversions were most marked (3 plus) in monkeys vaccinated into the peritoneum and testicle; in the others the conversions were slower and more transient.

Ernest Muir

BERGEL, M. Patogénesis de la lepra. [**Pathogenesis of Leprosy**] *Semana Méd.* 1956, Aug. 2 & 16, v. 109, Nos. 6 & 8, 215-25, 248; 321-33. [121 refs.] English summary.

NERURKAR, R. V. & KHANOLKAR, V. R. **Use of Fluorescence Microscopy in the Diagnosis of Leprosy.** *Indian J. Med. Res.* 1956, July, v. 44, No. 3, 397-402, 1 fig.

First a method of concentration of bacilli by the use of a pressure mincer is described. Biopsy material taken from the skin of a patient suspected of leprosy, or someone who has been in contact with leprosy infection, is soaked in 1 per cent. acetic acid for 3 or 4 hours and the epithelium is removed. The remaining tissue is cut into fine particles with scissors and then placed along with normal saline in the cylinder of the mincer, and the piston is screwed home. This process is repeated several times, the saline containing the bacilli being decanted each time. A mixture of petroleum ether and sulphuric ether is added to the saline and shaken vigorously causing levitation of the bacilli which later rise to the top of the tube. Smears are then examined either after staining by the usual Ziehl-Neelsen method or, preferably, by fluorescence microscopy with an objective of medium power. The latter technique is described and recommended, as with a 40 $\times$ objective it is possible to examine a field 5 times as large at one time, and detection of the few bacilli present is much quicker and easier.

Ernest Muir

KITAMURA, K. & NISHIURA, M. **Classification of Leprosy in Japan. Report of the Classification Symposium of the Japanese Leprosy Association.** *Internat. J. Leprosy.* New Orleans. 1956, Jan.-Mar., v. 24, No. 1, 1-12.

This symposium was held at the 28th annual meeting of the Japanese Leprosy Association. Four questions were put forward and answered:

(1) Should the neural type be maintained as one of the main types of leprosy? The general opinion was that cases which have nothing other than neurological syndromes with or without anaesthetic hypochromic macules should be brought together either as a type or subtype.

(2) Is the indeterminate group necessary as a clinical unit of leprosy? About this there was some absence of unanimity, but there was a tendency

to regard this as a stage (passing from one of the two main types to the other) rather than as a fixed group or type.

(3) Is the borderline group necessary as a clinical unit of leprosy? The majority thought it unnecessary, but 4 of the 14 speakers considered that it was necessary, to include cases passing from tuberculoid to lepromatous, and also those passing in the other direction.

(4) An acute infiltration condition was described, being a syndrome with erythematous infiltrated skin lesions, with fever of 37°-39°C. and joint pains, "all occurring acutely either in an early phase of lepromatous leprosy, or in the absorption period". It differs from the ordinary lepra reaction, and sections reveal tuberculoid structure with coexistence of lepra cells. The Mitsuda reaction tends to change from negative to weakly positive. [This seems to be what most workers would call the "borderline" group.]

The chairman (Kitamura) pointed out that the classification of leprosy is influenced by general ideas of medicine at the time the problem is discussed. "Especially in the last decade or two it has become more and more complicated by accepting—from the immunobiological and pathological points of view—various transitional and intermediate forms. On the other hand, there is no doubt that all clinical manifestations of leprosy can differ under various conditions of geography and race." The hope was expressed that this symposium would be of use in drafting a new and more universally acceptable classification at the international congress in India in 1958.

Ernest Muir

BROWN, J. A. K. **Susceptibility and Resistance in Leprosy.** *Leprosy Review*. 1956, Oct., v. 27, No. 4, 147-51.

In this paper the possible reasons are considered why some persons who have been in contact with leprosy acquire the disease and others do not. An example is given of a boy who showed early hypopigmented macules when he was 8, although there was no known contact with infection. This later developed into lepromatous leprosy. His mother developed a tuberculoid lesion a year after his lesions first appeared. The questions are posed whether the boy infected his mother, whether both were infected from the same unknown source, or whether the mother's tuberculoid lesion infected the son.

From this the author goes on to elaborate a hypothesis of susceptibility depending upon the presence or absence of a factor X. The susceptibility of the offspring will vary according to whether one, both or neither of the parents possess the X factor. Whether a contact will develop the disease or not, and the form taken by the disease, will, according to this hypothesis, depend to a large extent on the amount, if any, of the X factor inherited.

Ernest Muir

FRITSCHI, E. P. **The Pattern of Sensory Loss in Leprosy and its Significance in the Pathogenesis of Leprotic Neuritis.** *Leprosy Review*. 1956, Oct., v. 27, No. 4, 151-61, 3 figs. [11 refs.]

From 186 leprosy patients attending the orthopaedic research department at the Vellore Medical College in South India 304 hand charts were prepared showing the sensory loss in each case. Tests were made for light touch and for pain. Examinations were made by 2 separate observers, and the aggregate sensory changes are shown in two hand diagrams.

There was complete anaesthesia in 67 per cent. of lepromatous patients and in 50 per cent. of non-lepromatous. In patients with incomplete anaesthesia the commonest pattern was ulnar loss, and the area which retained sensation most commonly was the middle of the median area. "This suggests that the anaesthesia is not due to peripheral nerve fibre destruction but to the proximal nerve trunk lesion at the site of predilection." Ulnar nerve motor and sensory involvement is commonest. In the median nerve motor involvement is slightly more common than sensory involvement. Motor involvement is rare in the radial nerve, but sensory is common. The involvement of nerve trunks is thought to be due to their superficial situation, their relationship to bone and fascia, and particularly to the temperature of the nerves. *Ernest Muir*

JOPLING, W. H. **Borderline (Dimorphous) Leprosy maintaining a Polyneuritic Form for Eight Years: a Case Report.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Sept., v. 50, No. 5, 478-80, 2 figs.

A patient with neurological symptoms for 8 years was wrongly diagnosed as suffering from syringomyelia. When in 1954 a diagnosis of leprosy was made he was treated with DDS. After 4 months' treatment there were pains in the limbs and erysipeloid skin lesions. Previous to this a biopsy of the auricular nerve showed foamy cells between the nerve fibrils, but no epithelioid or giant cells; there were large numbers of acid-fast bacilli. Later a biopsy of the skin showed "patches of infiltration by mononuclear cells (histiocytes) and epithelioid cells", a few acid-fast bacilli, but no foam cells or giant cells. A diagnosis of dimorphous or borderline leprosy was made. [See also this *Bulletin*, 1956, v. 53, 1351.] *Ernest Muir*

CHATTERJEE, S. N. **Breathing Difficulty caused by Tuberculoid Lesions of Leprosy inside the Nose.** *Indian J. Dermat.* Calcutta. 1956, July, v. 1, No. 4, 139-40, 2 figs.

DE MACEDO, O. B. & BERTI, F. A hidrazida do ácido iso-nicotínico na reação leprótica. [**Isoniazid in Lepra Reaction**] *Rev. Brasileira Leprologia*. S. Paulo. 1955, Jan.-Dec., v. 23, Nos. 1/4, 41-52. [17 refs.]

After recounting the history of this drug in the treatment of tuberculosis and leprosy, the authors describe the cases of 26 lepromatous patients with lepra reaction (7 acute and 19 subacute), 1 tuberculoid and 1 dimorphous. The results of treatment with oral administration of isoniazid, 100-200 mgm. daily, are given as follows: very good 4, good 13, no improvement 4, abandoned treatment 7. The authors consider this the best oral treatment for subacute lepra reaction in their experience. They intend to test the effects of this drug given parenterally.

Ernest Muir

ROY, A. T. **Bacteriological Results of Treatment of Lepromatous Cases with Diaminodiphenyl Sulfone by Mouth for Periods up to Five Years.** *Internat. J. Leprosy*. New Orleans. 1956, Jan.-Mar., v. 24, No. 1, 45-50.

Details are given of treatment of 99 lepromatous patients with DDS, and the results after 5 years. As some of the patients fell out others were added, so that the length of treatment varied from 14 to 60 months, with an average of 44.5 months. During this period 9 patients became bacteriologically negative, 10 became nearly negative, in 25 the bacilli diminished by 25 per cent. and in 32 by 50 per cent., 19 were only slightly improved and 4 remained stationary. "It is impossible to predict from the degree of bacteriological positivity at the beginning of treatment how long it will take a case to clear up if it is to do so. Some cases with low BI's [bacteriological indices] took more time to become negative than cases with high BI's.

Ernest Muir

HODGES, W. A. A. **The Treatment of Deformities of the Foot in Leprosy.** *East African Med. J.* 1956, Aug., v. 33, No. 8, 301-3, 2 figs.

Deformity initially develops in neural leprosy after there is drop foot with anaesthesia. A minor trauma leads to trophic ulceration of the toes and sole. BRAND is quoted as recommending extensor tenodesis in early cases and triple arthrodesis in more advanced conditions with ulcers. [In a more recent article (this *Bulletin*, 1955, v. 52, 1094) Brand recommends transplantation of the tibialis posterior tendon and, after re-routing, insertion into the middle cuneiform bone. This operation is proving very successful (personal communication).]

The author operated on 15 patients in Tanganyika, 10 of whom had ulceration of the sole, doing a modification of the Lambrinudi operation and extending the skin incision so as to include the ulcer. A very large

wedge excision is required to produce a plantigrade foot when there is equinovarus deformity. After the operation the patients had padded plaster casts for 3 weeks, followed by walking plaster casts for 9 weeks. All the patients were able to walk well after 4 months. Two of the patients observed 15 months after the operation were walking well, had no ulcers and were able to work in the fields.

Ernest Muir

HADLER, W. A. & ZITI, L. M. Estudo da reação da lepromina no rato previamente inoculado com *M. lepraemurium* e com *M. tuberculosis* (BCG). [The Study of the Lepromin Reaction in Rats previously inoculated with *Myco. leprae-murium* and with *Myco. tuberculosis* (BCG)] *Rev. Brasileira Leprologia*. S. Paulo. 1955, Jan.-Dec., v. 23, Nos. 1/4, 53-75, 10 figs. & 6 graphs. [25 refs.] English summary.

Normal rats give a negative lepromin reaction. The present experiments were to test the effect on the lepromin reaction of previous inoculation with BCG or *Myco. leprae-murium*. In the first lot of rats, in addition to uninjected controls, 90 were injected with 0.1 ml. of *Myco. leprae* suspension, 20 with a larger and 20 with a smaller amount of a triturated suspension of a murine leprosy lesion.

The second lots of rats were first inoculated intraperitoneally with BCG and then 33 days later they were injected intradermally with mycobacteria killed by heat as follows: 30 rats with 0.1 ml. of a suspension of *Myco. leprae*, 20 rats with a larger and 20 with a smaller quantity of triturated lesion containing *Myco. leprae-murium*. The third experiment was very similar to the second, except that in place of BCG living *Myco. leprae-murium* were injected intraperitoneally 40 days before the intradermal injections were given. It was found that in the rats previously inoculated intraperitoneally with BCG or with *Myco. leprae-murium* the macroscopic lesion was larger and remained longer, while the histological lesions were more intense and showed necrosis. But the cytological appearances were not different from those in the controls.

Ernest Muir

NAGUIB, M. & ROBSON, J. M. The Effect of Cortisone alone and in combination with Isoniazid on Experimental Murine Leprosy in Mice. *Brit. J. Pharmacol. & Chemotherapy*. 1956, Sept., v. 11, No. 3, 326-9, 1 fig.

"1. Mice were inoculated intracorneally with *M. lepraemurium* and treated with cortisone, or with a combination of cortisone and isoniazid.

"2. Cortisone decreased the development of both macroscopic corneal and systemic lesions; nevertheless, the liver and spleen in most animals contained very large numbers of lepra cells filled with bacilli. Cortisone did not appreciably modify the beneficial action of isoniazid, except in

two mice in which gross systemic lesions occurred; this was not seen in mice on isoniazid alone."

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllbothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

AZIM, M. A., revised and completed by Anne GISMANN. **Bilharziasis Survey in South-Western Asia, covering Iraq, Israel, Jordan, Lebanon, Sa'udi Arabia, and Syria: 1950-51.** *Bull. World Health Organization.* Geneva. 1956, v. 14, No. 3, 403-56, 7 figs. [61 refs.]

This report contains the results of a rapid survey of schistosomiasis and its vectors in the countries of south-western Asia, namely Iraq, Jordan, Lebanon, Saudi Arabia and Syria.

The situation in Iraq is fairly well known, the disease being widespread and long-established in the middle and lower valley of the Tigris-Euphrates. It is concluded that a serious problem may arise after the completion of the proposed large irrigation works. In Israel both intestinal and vesical forms of the disease are reported to have been introduced by immigrants and they appear to have caused infections among the indigenous people, but the problem is not likely to be grave. In Jordan, although schistosomiasis is not officially recognized as endemic, the survey revealed 2 cases in refugees; no vector snails were found but the proposed irrigation canals might provide a suitable habitat for them. No evidence of human schistosomiasis was found in Lebanon but *Bulinus* snails were detected in several foci. Little has been known of the incidence or distribution of the disease in Saudi Arabia, and this survey has collected some valuable information. Vesical schistosomiasis was known to occur but only recently has the intestinal form of the disease been recognized as endemic. The present investigation found it widespread and probably even more important than the vesical infection, though it is mainly asymptomatic. *Bulinus* and *Biomphalaria* were collected, the latter in 12 different localities. Development of this territory may serve to spread the infection and increase its pathogenicity unless it is controlled. In Syria, where urinary schistosomiasis alone is endemic, 2 intense but localized foci were confirmed. *Bulinus* snails were collected but no *Biomphalaria* were found nor was intestinal schistosomiasis encountered.

Although the survey was neither comprehensive nor systematic this report adds considerably to knowledge of the distribution and incidence of human schistosomiasis in several of the countries of the Middle East.

T. H. Davey

DE MORAIS, T. As bilharzioses humanas na Zambézia (Moçambique). [**Schistosomiasis in Zambezia, Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1956, Mar.—June, v. 13, Nos. 1/2, 69–82, 4 figs. (1 folding). English summary.

In 1954, the author undertook a survey of schistosomiasis in the Zambezia district of Mozambique. Because of the nomadic habits of the adults in the Province, the study was confined to children and adolescents between 3 and 20, of whom 1,800 were examined for schistosomes.

The results are recorded in detail for age, sex and locality in a series of informative tables and maps.

S. haematobium was found alone in 81.9 per cent. of cases, *S. mansoni* in 9.7 per cent. and both together in 7.9 per cent. In 1.94 per cent. *S. haematobium* was found in the faeces, but *S. mansoni* was only found once in the urine.

The tables and maps indicate that while *S. haematobium* was evenly distributed throughout the 14 localities of the district of Zambezia (from 95.9 per cent. in Mocuba to 65.9 per cent. in Chinde), *S. mansoni* was limited to the central zone, especially in Mocuba, Morrumbala and Lugela, where it was about 26 to 27 per cent.

There were slightly more males infected with *S. haematobium* (83 per cent. males: 80 per cent. females). *S. mansoni* was found in 10.6 per cent. males, but only 8.3 per cent. females. The highest infection rates for *S. haematobium* were found in those under 15 years, especially below the age of 6. *S. mansoni* was commonest in those between 11 and 15 years and in persons over 20 years (but only 7 persons were examined in this last group). [For a previous survey in the South Save district, see this *Bulletin*, 1955, v. 52, 792.]

H. J. O'D. Burke-Gaffney

VERMEIL, C. Prophylaxie antibilharzienne dans le secteur sub-saharien de Tunisie: étude de quelques procédés. [**Prevention of Schistosomiasis in the Sub-Saharan Sector of Tunisia: Study of Several Procedures**] *Arch. Inst. Pasteur de Tunis*. 1956, June, v. 33, No. 2, 189–94.

A few children with *Schistosoma haematobium* infections were treated with stannous oxide (Bilharstan), desoxybenzoin (Désoïne, 1183 TH) or a thioxanthone derivative (Nilodin, lucanthone). The first two gave unsatisfactory results, and the third produced cure in only 8 of 14 subjects treated with full courses (0.2 gm. per 10 kgm. body weight daily for 5 days).

Tests were made with molluscicides—sodium pentachlorophenate and phenylmercuric acetate [BOND and NOLAN, this *Bulletin*, 1954, v. 51, 609]—in a pond fed by a slow stream. The pentachlorophenate was used as a powder containing 85 per cent. of the active substance, and the phenylmercuric acetate also as a powder containing 15 per cent. of polysubstituted benzene compounds. The preparations were placed in measured quantities in small muslin bags, and one was placed in the spring which was the source of the water, and one in the pond.

With pentachlorophenate the concentration in the water did not rise above 2 p.p.m., and the mortality of *Bulinus contortus* was about 20 per cent. 48 hours after the beginning of the experiment; eggs remained alive. With phenylmercuric acetate the concentration was 0.5 p.p.m. and mortality was about 66 per cent.; eggs were killed.

The author concludes that phenylmercuric acetate is effective in these conditions, but that for satisfactory dispersion the water should be strongly agitated; it is less suitable than pentachlorophenate for sluggish waters.

Charles Wilcocks

MARILL, F. G. Conditions d'aménagement des réseaux d'irrigation et prophylaxie de la bilharziose urinaire. [**Irrigation Canals and the Prevention of Urinary Schistosomiasis**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 373-8.

The distribution of snails has been studied in relation to 14 large irrigation schemes in Algeria and from the study the following conclusions are drawn. (1) The material of the canals has no influence on the distribution of molluscs. The identifications of snails collected from concrete, masonry and rough channels are given, showing an equal distribution except where earth and concrete are close to each other, when the concrete sections may be free. (2) Snails, and particularly *Bulinus contortus*, may be distributed equally in systems with open air and enclosed conduits under pressure. This distribution has occurred even through enclosed conduits where the water passes through a filtering plant. (3) The form of outlet of reservoirs has no influence on distribution of snails (notably *B. contortus*) from them. Examples are collected of free distribution from outlets from reservoirs at variable depths including one at 34 m. below the surface. (4) Passage through pumping plants and other machinery has equally no influence on distribution. Examples are quoted of distribution along systems which inevitably involved passage through turbines and sluice cocks where there was great disturbance of water.

It is concluded that in a scheme for the control of schistosomiasis on irrigation systems measures must be adopted to make the establishment of colonies impossible and to control any which occur, by methods such as drainage of seepages and swamps and periodically treating the systems rather than by relying on control of distribution of the snails in the

system. The study includes statements of the site of several collections and the species recorded, which will be of special interest to malacologists.

G. Macdonald

KLOCK, J. W. **An Automatic Molluscicide Dispenser for Use in Flowing Water.** *Bull. World Health Organization*. Geneva. 1956, v. 14, No. 4, 639-46, 3 figs.

The apparatus described here automatically dispenses chemical in liquid form in flowing water. Essentially it consists of a siphon tube, one limb of which rests in the chemical which flows through it and is discharged from the other limb into the water to be treated. The depth to which the siphon is immersed in the chemical is controlled by a float resting on the water behind a measuring weir. As the flow through the weir increases, the float rises, the siphon sinks in the chemical, the hydrostatic head becomes greater and, in consequence, more chemical is dispensed.

Formulae are given for correlating the discharge of the stream with the hydrostatic head. Each chemical dispenser has to be calibrated separately. Six of these instruments have been used in the field, of which 2 have been operated for more than seventy 24-hour treatments in 4 months without failure or mechanical complication. It is claimed that they save much time for the field staff, have increased the effectiveness of the molluscicidal treatment and have reduced costs to a quarter of the previous figure.

The apparatus is described in detail and those interested should consult the paper.

T. H. Davey

EASTMAN-NAGLE, E. R. D. **Schistosomiasis mansoni in Swaziland. Survey by Rectal Biopsy.** *South African Med. J.* 1956, Sept. 15, v. 30, No. 37, 890-95, 4 figs.

Rectal schistosomiasis was known to exist in Swaziland but its prevalence had not been estimated. This article reports the results of a survey carried out by means of rectal biopsies. The technique of the biopsy is described and a method was evolved by means of which 40 or more specimens could be examined per hour. By means of rectal biopsy the incidence of schistosomiasis among 1,256 schoolchildren was found to be 29 per cent. with *Schistosoma haematobium* only, 3 per cent. with *S. mansoni* only and 4 per cent. with both parasites. In a series of 114 senior pupils whose urines and rectal biopsies were examined concurrently, 6 per cent. showed *S. haematobium* ova in the urine while 51 per cent. showed them in the biopsies. This result suggested that ova may be retained longer in the rectum than in the bladder. The distribution of infection among 18 centres in the territory, as demonstrated by rectal biopsy, was 15 per cent. *S. haematobium* and no *S. mansoni* in the High-Veldt (over 4,000 feet), 40 per cent. and 9 per cent. respectively in the

Mid-Veldt (about 2,000 feet) and 32 per cent. and 13 per cent. respectively in the Low-Veldt (1,000 feet or less). Factors concerned in the geographical distribution are discussed but the variation in the incidence of *S. mansoni* is not yet fully understood.

T. H. Davey

PARAENSE, W. L. **Self and Cross-Fertilization in *Australorbis glabratus*.** *Mem. Inst. Oswaldo Cruz.* 1955, June-Sept.-Dec., v. 53, Nos. 2, 3 & 4, 285-91. [Portuguese version 277-84. (11 refs.)]

"A single specimen of *A. glabratus* grown in isolation is able to reproduce quite well by self-fertilization. If it joins another conspecific individual, however, it reproduces exclusively by cross-fertilization.

"The possibility of a single specimen being able to give rise to a population may explain the occurrence of some colonies of planorbids showing particular characteristics and rather little individual variation, besides denoting that after treatment with planorbicides a single surviving specimen will be able to restore the population.

"By using the factor of albinism as genetic marker in crossing experiments, in F_1 generation a distinction can be easily made between the specimens obtained through cross- and self-fertilization.

"The use of albino snails in genetical experimentation applied to systematics will contribute to the biological recognition of species, thus reinforcing the morphological criterion."

PARAENSE, W. L. & DESLANDES, N. **Reproductive Isolation between *Australorbis glabratus* and *A. nigricans*.** *Mem. Inst. Oswaldo Cruz.* 1955, June-Sept.-Dec., v. 53, Nos. 2, 3 & 4, 325-7. [Portuguese version 321-4.]

"Crossing experiments were made between specimens from one population of *A. glabratus* and another of *A. nigricans*, the factor of albinism having been used as a genetic marker. The results of those experiments revealed a complete reproductive isolation between both populations, thus indicating their specific distinctness according to the biological criterion."

JOVE, J. A. **Use of Molluscicides in the Control of Bilharziasis in Venezuela. Equipment and Methods of Application.** *Bull. World Health Organization.* Geneva. 1956, v. 14, No. 4, 617-38.

This article gives a detailed account of the organization and methods of application of molluscicides used in the control of *Biomphalaria guadeloupensis* (*Australorbis glabratus*) in Venezuela. The molluscicides employed were: copper sulphate at 100 parts per million for 3 hours combined with tartaric acid at 20 p.p.m., to prevent its precipitation as

copper carbonate; sodium pentachlorophenate at 5 p.p.m. for 24 hours; and copper pentachlorophenate at 15 p.p.m. for 6 hours.

The techniques of application of the chemical and of testing results in running and still water and in marshes are described but cannot be satisfactorily abstracted. The copper-sulphate-tartaric-acid complex, though a good molluscicide, was not effective in running water for such long distances as the other compounds because of precipitation and absorption by suspended silt or organic matter. When used in sprayers the proportion of tartaric acid to copper sulphate had to be reduced to 1:50 in order to prevent clogging by copper tartrate. Sodium pentachlorophenate in high concentrations was irritating to the snails which tended to migrate out of the water, and it had herefore to be used in low dosage over a long period. It was not readily precipitated or absorbed and was effective in running water for distances up to 6 km. from the dosing point. Copper pentachlorophenate was produced by solutions of sodium pentachlorophenate and copper sulphate which were introduced into the water close to each other but sufficiently apart to prevent the formation of insoluble copper pentachlorophenate compounds. This proved the most promising molluscicide used. It did not precipitate out and was not easily absorbed by clay or organic matter. It was not irritating to snails even in high concentrations and was as effective as sodium pentachlorophenate over long distances.

This is a valuable paper which will be of assistance to workers concerned with the control of schistosomiasis vectors.

T. H. Davey

HUNTER, G. W., KEMP, H. A., SMALLLEY, H. E., WILKINS, O. P. & DIXON, C. F. **Studies on Schistosomiasis. XII. Some Ointments protecting Mice against the Cercariae of *Schistosoma mansoni*.** *Amer. J. Trop. Med. & Hyg.* 1956, July, v. 5, No. 4, 713-36, 5 figs. [30 refs.]

A long investigation has been carried out in a United States Army laboratory to find an ointment which would protect the skin of soldiers from invasion by cercariae. Various tests were used, but the chief one consisted of partially immersing mice (with or without ointment) in warm water for 4 hours and then exposing them to cercariae for 30 minutes ("four-hour immersion test"). A total of 134 compounds were tested and 18 yielded excellent results. The best ointments in these laboratory trials appeared to be: Actamer 10 per cent. with Silicote; Actamer 5 per cent., hexachlorophane 3 per cent. and benzyl benzoate 20 per cent. in wool fat; benzyl benzoate 20 per cent. and Covicone with repellents; hexachlorophane 5 per cent. and wool fat; hexachlorophane 3 per cent. and Pro-derna.

These (and other) ointments gave complete protection with experimental animals. It is planned to check them for toxicity to man, and also to

test them with animals against other human schistosomes. Actamer (2,2'-thiobis(4,6-dichlorophenol)) is the trade name for bithionol; it is a white crystalline solid, relatively insoluble in water and often used as a bacteriostatic agent in soaps. Hexachlorophane (G 11) is 2,2'-methylene bis (3,4,6-trichlorophenol). Silicote is composed of 30 per cent. silicone oils in a petrolatum base. Covicone is a commercially prepared skin protectant cream; it contains silicone, nitrocellulose, and castor oil. Pro-derna is a commercial skin protectant containing 52.5 per cent. silicone in an inert hydrated aluminium base.

[The work described in this paper has been very detailed and thorough, and it should yield an efficient ointment for protecting the skin against cercariae. The paper should be consulted in the original by all who are interested in this subject.]

F. Hawking

Hou, P. C. **The Pathology of *Clonorchis sinensis* Infestation of the Liver.**

J. Path. & Bact. 1955, July, v. 70, No. 1, 53-64, 25 figs. on 12 pls.

This paper is illustrated by an excellent series of photomicrographs that demonstrate the points made by the author; those particularly interested in this subject will wish to see them in the original paper.

The study is based on 500 autopsies on subjects with clonorchiasis. [A total of 776 autopsies is referred to elsewhere in the paper.]

The larvae of the worm develop in the stomach and duodenum from cysts in infected fish, and migrate via the common bile duct up the biliary tree until they reach the smaller bile ducts where they develop into adults. Their organs of locomotion are their two suckers which often damage the delicate biliary mucosa. They retain their position in the small bile ducts at first by these suckers and later by the sticky mucous exudate or fibrinous exudate where the mucosa is excoriated. The adult worms may migrate back from the small to the larger bile ducts or even the common bile duct, but seldom (2 per cent.) enter the gall bladder; when they do they normally die. They may enter the pancreatic duct (6 per cent.); here they survive well.

The naked-eye appearance of the liver is usually normal in light infections. In heavier infections there are localized dilatations of the bile ducts that can be seen on the surface under the serosa as pale blue or greenish-blue blebs; there is slight thickening of the bile-duct walls. Generalized dilatations of the bile ducts are also seen, but infrequently (1.6 per cent.). There is some atrophy of the parenchyma cells in the proximity of these dilated bile ducts, but, in the absence of bacterial infection, little other microscopical change. The pancreatic ducts are dilated when this organ is invaded, but there are no other changes.

Histologically, the changes can be divided into 2 groups according to whether there is bacterial infection or not. In the latter group, there is usually little adenomatous-tissue formation and little fibrosis in mild worm infections; but when the infections are heavier there is considerable

adenomatous-tissue formation. In the chronic long-standing worm infections there is little adenomatous tissue but abundant connective-tissue proliferation with excessive formation of both collagen and elastic fibres, especially the latter. The author discusses the cause and significance of the adenomatous proliferation which is apparently a reaction to the excreted metabolites of the living worms. The eggs do not play any significant part in these changes and are rarely found in the small bile ducts except where there is a blockage and a resultant bacterial infection.

Of the complications, biliary obstruction is common: it is caused either by adenomatous proliferation, calculus formation, or cholangitis, but seldom by mechanical action of the worms or their eggs. The author considers that there is a positive correlation between clonorchiasis and biliary calculus [but the figures quoted do not support this impressively]. Cholangitis is usually associated with bacterial infection, and may result in multiple abscess; the bacterium responsible is usually *Bacterium coli*.

Other points made by the author in his summary are:

"Malignant change in the adenomatous tissue of the bile ducts is one of the most serious consequences of the disease. . . .

"There is no direct relationship between *Clonorchis sinensis* infestation and multilobular cirrhosis of the liver. . . .

"*Clonorchis* infestation causes dilatation of the intrahepatic portal veins. . . .

"The anatomical changes of clonorchiasis in man are somewhat different from those in small laboratory animals." L. E. Napier

CH'IN, Wen-Ch'ing & CH'EN, Hsing-Jo. **Cerebral Paragonimiasis complicated by Epidemic B Encephalitis.** *Chinese Med. J. Peking.* 1956, July-Aug., v. 74, No. 4, 387-92, 8 figs. on 2 pls. [10 refs.]

"A case of cerebral paragonimiasis complicated by epidemic B encephalitis is reported. It is believed that the parasitic lesions in the brain favor the entrance of the neurotropic virus of encephalitis after the blood-brain barrier is damaged."

ČMELÍK, S. & BARTL, Z. Zusammensetzung der Lipide von *Taenia saginata*. [The Lipids of *Taenia saginata*] *Hoppe-Seyler's Ztschr. physiol. Chem.* 1956, v. 305, Nos. 4/6, 170-76, 4 figs. [16 refs.]

JACKSON, F. C. **The Treatment of Tapeworm Infestation with Dichlorophen.** *South African Med. J.* 1956, Sept. 8, v. 30, No. 36, 853-4.

Numerous tapeworms and roundworms have often been seen on inspection of compound latrines in Germiston, South Africa, but complaints of worm infection are rare among the 1,100 African municipal workers living

there. Hitherto, because of a number of practical difficulties, mass treatment has not been undertaken.

Dichlorophen (2:2'-dihydroxy-5:5'-dichlorodiphenylmethane) is an effective taenicide in veterinary practice and is well tolerated, even in large doses. The author obtained a supply of purified Dichlorophen for medical trial and tried it on volunteers willing to undergo treatment.

The drug was given to 44 volunteers after work on Saturday, in a dosage based on one 0.5 gm. tablet per 16 lb. body weight. The tablets were given in a single dose, without prior fasting and purgation and followed by a draught of water. The minimum dose was 7 tablets and the maximum 12. The trial was repeated with 34 more volunteers at the next weekend.

At the first trial, 13 patients voided tapeworms only, and 7 voided tapeworms and roundworms. At the second trial, the figures were 10 and 4. In some of the volunteers there was a striking improvement in general health. There were no recurrences in 5 months.

The author rightly points out that the weakness of the trials lies in the fact that the previous presence of tapeworms could not be established.

In the 2 trials, 11 patients had diarrhoea, 7 had mild abdominal discomfort and 3 had transient urticarial eruption. No patient failed to report for work on the Monday morning. *H. J. O'D. Burke-Gaffney*

BEAVER, P. C. **The Record of *Ancylostoma braziliense* as an Intestinal Parasite of Man in North America.** *Amer. J. Trop. Med. & Hyg.* 1956, July, v. 5, No. 4, 737-8.

The only report of human intestinal infection with *Ancylostoma braziliense* in North America is that occurring in a Texas boy, published by Dove some 25 years ago [this *Bulletin*, 1932, v. 29, 760].

The present author, from Tulane University, summarizes Dove's observations, and criticizes them on the following grounds: (1) it is possible that Dove's experimental animals were free from natural hookworm infections, but the inclusion of control animals would have strengthened the experiments; (2) faecal culture as used by Dove was probably not trustworthy as a means of demonstrating the presence or absence of hookworm infection, because in some cases very scanty yields of larvae were produced from cultures of large quantities of faeces; (3) Dove recognized that the skin reactions to his 3 experimental inoculations were no less characteristic of *Necator* than of *A. braziliense* or *A. caninum*; (4) it is unlikely that *Necator* would mature in 23 days, since carefully observed *Necator* infections have not produced eggs earlier than the 6th to 7th week after penetration of the larvae.

Beaver therefore concludes that the Texas boy in Dove's report was probably infected with *Necator* only and that there is thus no verified record of *A. braziliense* in man in North America.

H. J. O'D. Burke-Gaffney

DESCHIENS, R. & BÉNEX, Jacqueline. Syndrome de Löffler chez le cobaye dans la strongyloïdose expérimentale. [**Löffler's Syndrome in the Guinea-pig in Experimental Strongyloidiasis**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 293-6, 2 figs. on 2 pls. [10 refs.]

The authors (*Bull. Soc. Path. Exot.*, 1956, in press) have shown that percutaneous inoculation of the strongyloid larvae of *Strongyloides fülleborni* of the chimpanzee into the guinea-pig will produce a hypereosinophilia. They refer to literature on Löffler's syndrome in man and the guinea-pig produced by ingestion of the eggs of *Ascaris lumbricoides*, by extracts of *A. lumbricoides*, *Fasciola hepatica* and *Taenia saginata* and by hydatid fluid.

In this paper they describe the percutaneous inoculation of 8 guinea-pigs with the larvae of *Strongyloides fülleborni*. Biopsy showed that the larvae were in the dermis 15 minutes after inoculation. The guinea-pigs had 0.5 per cent. of eosinophils and a count of 60 to 520 eosinophils per cmm. before inoculation. Six days after it they had 7 to 27 per cent. of eosinophils and a count of 800 to 4,190 per cmm. A figure shows the radiogram of one of two of the guinea-pigs taken while they were alive. Radiograms showed light but clearly visible opacities of the inferior two-thirds of the right pulmonary field, similar to those seen in Löffler's syndrome in man. These opacities were not present in radiograms of two control guinea-pigs. Autopsy of 5 of the other guinea-pigs showed light but evident pulmonary oedema, small foci of alveolitis and peribronchial infiltration.

G. Lapage

STRANSKY, E. & REYES, A. **Ascariasis in the Tropics (with Considerations on its Treatment)**. *J. Trop. Pediatrics*. London. 1955, Dec., v. 1, No. 3, 174-87. [48 refs.]

The greater part of the paper is an excellent review on the subject of the importance of *Ascaris* infection in the tropics, its pathogenesis and treatment. The authors then report the results of treatment with papain in 30 cases of ascariasis and with diethylcarbamazine in 10 cases "for comparison". [The results, however, are not comparable in view of differences in technique, nor in fact do the authors make any serious attempt to compare them, except to state that they consider the results with the latter drug inferior, a fact not entirely borne out by the tabulated data.]

Papain was given in the form of Vermizym, "3 doses of a teaspoon each at 1½-hour intervals commencing early in the morning". Stoll egg counts were carried out before and after treatment and the worms passed were counted. [It is not stated definitely when the second counts were done, but indirect evidence suggests that it was a week after the single-day course.] In 3 instances no eggs were found at the second examination; in 8 cases the results were striking—a reduction by about 90 per cent.;

in 2 cases the reduction was negligible and in 2 cases there was an increase. One child died of peritonitis. In every case worms were passed, all of which showed evidence of digestion.

In 28 cases there was a *Trichuris* infection also; in 5 of these eggs were not found at the second count, and in 7 others there was a striking reduction in the number of eggs. The treatment had no effect on ankylostome infections.

L. E. Napier

BROWN, H. W. **Therapy of Ascariasis with Piperazine.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 947-52.

Piperazine has been used in the treatment of infection with *Ascaris lumbricoides* on a number of occasions during the last 7 years. In most series reported the treatment was spread over several days: the author felt that there was a considerable advantage from the public health point of view in a shorter course.

Piperazine citrate was given to 135 children in the form of a syrup, each ml. of which contained piperazine equivalent to 100 mgm. of the hexahydrate. For a 1-day or a 2-day course a dose of 20 ml. was given daily to children of 30 to 50 lb., 30 ml. to those of 51 to 100 lb. and 35 ml. to children above 100 lb. For the 5-day course, in which the smaller children were included, the dosages were 5 ml., 10 ml. and 20 ml. daily for children of weights 15 to 30 lb., 31 to 60 lb. and above 60 lb., respectively. The syrup was given approximately 1½ hours after breakfast, but for the 5-day course the daily dose was divided.

An egg count was made by Stoll's technique in each case before treatment, and 2 to 3 weeks after completion of treatment 2 smears were examined and an egg count made if any eggs were found.

Of 46 patients given a 1-day course, 34 (74 per cent.) showed no eggs after treatment; of 53 patients given a 2-day course, 50 (94 per cent.) were cured, and of 36 given a 5-day course 33 (91 per cent.) were cured. The reduction in the total egg counts in the 3 groups was 92 per cent., 99.6 per cent. and 93 per cent., respectively.

The failures were mostly in the heavier children who received a single dose equivalent to 3.5 gm. of piperazine hexahydrate. In one case only was there a minor toxic effect possibly due to the drug.

L. E. Napier

FAN, P. C. & HSU, J. **Filariasis in Free China. Part I. Incidence in Taiwan, Penghu (Pescadores) and Kinmen (Quemoy).** Reprinted from *Chinese Med. J.* Taipei. 1954, Jan., 77-86, 4 figs. [25 refs.] **Part II. Incidence in Taiwan Chinese.** *Ibid.*, 1955, Dec., v. 2, Nos. 3/4, 151-64, 1 map & 4 figs.

Although the southern part of Taiwan lies south of the Tropic of Cancer, in only one of the several previous surveys for microfilariae had endemic filariasis been noted in the island.

I. Microfilariae were found in a girl student and on investigation of her home village in south Taiwan filariasis was discovered to be endemic. A survey covering southern Taiwan and the Pescadores Islands was undertaken in which 25,884 people (11,909 indigenous and 13,975 mainland Chinese) were examined by thick blood film taken between 10 p.m. and 1 a.m. An infection rate of 4.8 per cent. was discovered, the incidence being lower in the mainlanders than in the indigenous population. Among the latter the Kinmen islanders had the highest incidence (19.1 per cent.) followed by those from Penghu (14.3 per cent.), the Taiwan people showing the lowest rate (1.5 per cent.). Among the mainland Chinese 4.4 per cent. carried microfilariae. These had come from 35 provinces of China but the majority were from 9 areas, all but 2 of which were known endemic centres of filariasis. In 81.5 per cent. of positive findings the parasite was *Wuchereria bancrofti* and in 17.2 per cent. it was *W. malayi*, while 1.3 per cent. were infected with both parasites. The indigenous cases were all infected with *W. bancrofti* but 34.3 per cent. of mainland Chinese had *W. malayi* infections.

II. Details are given in this paper of the distribution of infection in the 5 prefectures of south Taiwan and it is shown that infection was confined to 6 villages in 2 neighbouring districts. Analysis of the age and sex distribution showed that though the total infection rate was higher in males it was lower than that in females up to the age of 30 when it became much higher. The intensity of infection followed the same pattern, and the picture was that of light infections, showing in 84 per cent. of cases a count between 1 and 50 microfilariae per 20 cmm. of blood. The age incidence of infection ranged from 2.6 per cent. in the 1 to 5 age-group to 7.1 per cent. in the 41 to 50 age-group, and it then declined to 4.6 per cent. in those aged over 50.

T. H. Davey

BEYE H. K., MILLE, R., THOORIS, G. & TAPU, J. **Preliminary Report on the Use of the Antigen of *Dirofilaria immitis* as an Epidemiologic Tool and as a Therapeutic Agent in *Wuchereria bancrofti* Infections in French Oceania.** *Amer. J. Hyg.* 1956, July, v. 64, No. 1, 23-9. [21 refs.]

The skin test was conducted by injecting 0.01 ml. of a 1 in 8,000 dilution of *Dirofilaria* antigen intradermally. A wheal which at 20 minutes after the injection was at least 3 mm. larger than the initial wheal was interpreted as a positive response. Among 448 Polynesians in Tahiti, 74 per cent. gave a positive skin reaction and 17 per cent. showed microfilariae in the blood. Of the latter, 8 children and 3 adults gave a negative skin reaction, in spite of having microfilariae in the blood, and one man with advanced elephantiasis consistently gave negative skin reactions.

Further studies were made on the relationship between the skin reaction and the length of residence in French Oceania of 813 Europeans and Polynesians. Of those resident less than 2 years, 10 per cent. gave a

positive skin reaction; of those resident more than 5 years, 65 per cent. were positive. In further tests, it was found that Polynesian children less than 5 years old showed a positive skin reaction in 50-57 per cent. of cases, while in 36 Europeans who had been in Tahiti less than 6 months there was no positive reaction. Among Polynesians the skin reaction rate among females was approximately the same as that for males of the same age, although the microfilarial rate is lower. The skin reaction rate increased with age, being about 32 per cent. in children up to 2 years old, 62 per cent. in the group 2-4.9 years, 73 per cent. in the group 8-10.9 years, and 87 per cent. in the group over 13 years. The skin test was still positive in 2 Europeans who had lived in Tahiti for 1 year and then been away for 9 and 15 years, respectively; this suggests that sensitivity may be of long duration in some people [unless these were cases of non-specific reaction].

Thirty-eight patients with recurrent attacks of lymphangitis were given subcutaneous injections of *Dirofilaria* antigen in gradually increasing amounts at weekly intervals in order to desensitize them; 29 of these showed definite diminution in the frequency of attacks and 7 showed no significant change. These results are considered encouraging. It is suggested that an allergic factor may be concerned in precipitating attacks of lymphangitis. [See also CLEARKIN, this *Bulletin*, 1944, v. 41, 598.]

F. Hawking

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Mosquito-Borne Diseases. Filariasis. Further Studies on the Hospitability of some *scutellaris* Group and other Mosquitoes towards *Wuchereria bancrofti* from New Caledonia** [BACKHOUSE, T. C. & WOODHILL, A. R.]. *Technical Information Circular No. 17*. 1956, May, 4 mimeographed pp.

"1. *A. pseudoscutellaris* and *A. polynesiensis* were susceptible to infection with *W. bancrofti* from New Caledonia in the percentage of 89.4 and 96.6 respectively. It is probable that the difference was due to the experimental conditions rather than to a small variation in susceptibility.

"2. *A. s. katherinensis* and *A. albopictus* are inhospitable to *W. bancrofti* of New Caledonia.

"3. The Sydney strains of *A. vigilax* and *C. fatigans* are highly susceptible to infection with New Caledonia *W. bancrofti*. The infection rates with both these species agree closely with those obtained using the identical strain of microfilariae with the New Caledonian mosquitoes."

[See this *Bulletin*, 1955, v. 52, 561.]

ROMITI, C. **The Primary Aspect of the Disease Syndrome of Bancroftian Filariasis in British Guiana.** *West Indian Med. J.* 1956, June, v. 5, No. 2, 113-19, 1 fig. on pl.

The term "filariasis" is usually used to indicate both infection with filariae and all pathological conditions which are connected with this infection.

In 1932 the author published his idea of the life-cycle of *Wuchereria bancrofti* in man [see this *Bulletin*, 1933, v. 30, 705]. The purpose was to show where the parasite lived and reproduced itself during the asymptomatic stage of the infection. He called this site the "normal habitat" of the worm, which he considers is situated in the lymphatics accompanying the spermatic artery and the spermatic cord in the male and in those accompanying the ovarian vessels in the female. This does not mean that adult worms alive, dead or calcified cannot be found anywhere else outside their normal habitat.

By physical signs is usually meant a condition which can be detected by physical examination in the absence of subjective symptoms. Those of *W. bancrofti* may be grouped under the headings of genital and lymph nodal foci. In British Guiana the first are the most common and most important.

The average microfilaraemia among the inhabitants of the coastal and river estuaries of British Guiana can be reckoned at 20 per cent. In a survey done between 1924 and 1933 among all unselected patients at Mackenzie Hospital the incidence was as high as 40 per cent. in Africans and Portuguese. In East Indians it was 20 per cent. Chinese were very rarely infected and no case has been registered in any European-born immigrant. When the percentage of those with microfilaraemia is added to those with physical signs, as is well known the incidence of the disease becomes extremely high. It so happens that one person may show an extremely high microfilarial count without any clinical manifestations, while another may demonstrate the most advanced morbid conditions without microfilaraemia.

The physical signs should conform to two essential conditions:

- (1) They must be present in organs capable of external examination.
- (2) They must have assumed a reasonable size so as to leave no doubt about their deviation from the normal.

In British Guiana the earliest, most reliable and usually the *only* physical sign is varicolymphocele of the spermatic cord. The onset and progress of the lesion have been easy to study during operations for inguinal hernia and hydrocele. In filarial patients the dilatation of the vessels of the group distributed along the spermatic artery and pampiniform plexus is a constant finding. Immature worms have been found at an early stage in dilated lymphatics. In the female identical findings are encountered at the performance of pelvic laparotomies. In the male some oedema appears when the dilatation and varicosity increase. This is followed by hyperplasia of connective tissue until by degrees the stage of elephantiasis of the cord and epididymis is reached. The testes to a great extent escape. In the female the changes in corresponding areas are very similar. One peculiar finding in some females is the presence of a small

amount of free fluid in the pouch of Douglas, similar in appearance to hydrocele fluid.

The presence of adult living worms in dilated lymph-vessels is the best proof of the cause of varicosities, as complete blockage does not take place in the primary aspect of the disease.

During 30 years of surgical practice in British Guiana the author has performed about 27,000 operations; many of the patients were infected with filariae. In spite of careful search no signs of early morbidity of lymphatics have been encountered similar to that seen in the "normal habitat."

In only 5 or 6 of over 7,000 laparotomies was any dilation of the thoracic duct, described in text books as the cause of chyluria, discovered. In fact chyluria, as the author has established, is not due to this cause, but to obstruction and rupture of a very limited lymphatic vessel of any tract of the urinary system.

Romiti then advances evidence of the disappearance of microfilariae from the peripheral blood after his operation for filarial varicolymphocele, which consists of the separation of the vas deferens and its vessels from the dilated lymphatic vessels which are removed together with the veins from the internal inguinal ring to the mediastinum of the testis. When adult worms are present they emerge from the distal end of the resected lymphatics.

In two cases in which the blood was negative for microfilariae a very early dilation of the lymphatics in the distal part of the cord was found and removed. In both cases immature worms, too young to have reached the stage of reproduction, were found in the lymphatic dilatation. Cases quoted and other evidence collected by Romiti suggest that in no other section of the lymphatic system were these adult worms living and reproducing.

Philip Manson-Bahr

OJHA, K. N. **Effect of Oral Sodium Fluoride Therapy in Cases of Filariasis and its Effect on the Serum Calcium Level. Preliminary Report.** *Indian J. Med. Sci.* 1956, Aug., v. 10, No. 8, 619-24.

The results of this paper are dealt with in two parts: (a) the effect of sodium fluoride on the manifestations of filariasis, such as elephantiasis, lymphangitis and lymphadenitis; (b) the effect of sodium fluoride therapy on serum calcium and its correlation with the progress of improvement in the patients with filariasis.

(a) One teaspoonful of 0.1 per cent. sodium fluoride solution, diluted in 10-12 oz. of water, was given orally three times daily to 37 patients with filariasis. They were observed after one week's treatment and regularly once a fortnight when treatment was continued for several months.

There were 22 cases of elephantiasis of the leg or arm in which great improvement was observed and the latter disability is recorded as having

disappeared completely. In 15 cases of lymphangitis and epididymitis significant improvement was recorded. In the case of the former any recurrences were easily controlled. As shown in the table oral fluoride therapy not only reduced the swelling of filarial elephantiasis but was also beneficial for other manifestations of filariasis. In cases of short duration with soft swellings it was more efficacious. Elephantiasis of the arms was more easily controlled than that of the legs.

The work was begun as long ago as 1948 and the long intervening period has given the opportunity of following up a few cases for a number of years. Although recurrences of fever and lymphangitis were noted they could all be controlled by repeating the treatment for a week or fortnight.

(b) The observation that intravenous injection of calcium gluconate increased the swelling of elephantiasis and the fact that fluorides, pharmacologically, have the action of lowering the calcium in the blood led the author to investigate the action of sodium fluoride in filarial elephantiasis.

Serum calcium was first estimated in 6 cases of elephantiasis before administration of sodium fluoride. They were then treated in the manner described above. The serum calcium was determined again after one week's treatment and subsequently every fortnight or once a month throughout the period of treatment.

In all 6 cases the value of serum calcium was higher than normal and only in one case was it within normal limits (9.5 to 11.5 mgm. per cent.). On the administration of fluoride the serum calcium was lowered even at the end of the first week's treatment and then the fall in the subsequent weeks was gradual. The results are shown in a table. At the same time the improvement in the swelling was registered. When the serum calcium level was reduced to 8 mgm. per cent. the treatment was either discontinued or the dose reduced to half a teaspoonful twice daily. It had already been observed by K. V. PILLAI that in areas of endemic fluorosis filariasis is absent and this may be due to the fluorine content of the domestic drinking water which keeps the serum calcium below normal.

Philip Manson-Bahr

THOORIS, G. C. Le traitement de la filariose à *Wuchereria bancrofti* par le Thiacétarsamide de sodium en Océanie française. [**The Treatment of Filariasis due to *Wuchereria bancrofti* by Sodium Thiacetarsamide (Arsenamide) in French Oceania**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 306-11, 2 figs.

Thirty-five patients were chosen, of whom 32 had microfilariae and 21 showed clinical symptoms of filariasis. The thiacetarsamide (Arsenamide) was given intravenously in daily doses of 0.1 ml. ["0 cm³ 1''"] 1 per cent. solution per kgm. for 15 days. At the end of treatment, in all except one patient, the microfilarial count was zero or much diminished; 10 patients still showed a few microfilariae and the total count was reduced by 97 per

cent. One year later 4 still had microfilariae and the total count had been reduced by 68 per cent.

Before treatment the monthly average number of attacks of lymphangitis (in the 18 people suffering from it) had been 0.75. Three months after treatment it was 0.04 per person per month. In one case haematochyluria disappeared at the end of treatment, but in another chyluria persisted.

None of the 35 patients showed reactions severe enough for treatment to be interrupted, but 8 of them suffered from pyrexia between the 6th and 14th days of treatment. One patient had a severe attack of lymphangitis during treatment. Two patients suffered from pruritus which subsided under treatment by antihistamines. Injection outside the vein produced intense local inflammation.

[This compound certainly has a strong filaricidal action on the adult worms and on the microfilariae, but there is also a possibility that it may produce fatal liver necrosis; one such case has been reported by McFADZEAN and HAWKING (this *Bulletin*, 1954, v. 51, 708). In view of this and of the availability of a safe and effective treatment in diethylcarbamazine, it is doubtful whether the use of thiacetarsamide is justified to treat a non-fatal infection such as bancroftian filariasis.]

F. Hawking

THOORIS, G. C. Le traitement expérimental de la filariose à *Wuchereria bancrofti* en Océanie française par la suramine. (Naphuride de sodium.) [**Experimental Treatment by Suramin (Sodium Naphuride) of Filariasis due to *W. bancrofti* in French Oceania**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 311-17, 2 figs.

Of 20 persons studied, 14 had regular attacks of lymphangitis at least 2 per month; 8 were carriers of microfilariae, 3 had elephantiasis of the lower limbs and one had chyluria. The suramin was administered intravenously 1 gm. per week for 7 weeks; the first dose was only 0.5 gm. The subjects were naturally exposed to infected mosquitoes, and attacks of lymphangitis after more than 3 months from the end of treatment might be due to reinfection.

Before treatment the 20 persons showed regularly an average of 2.9 attacks of lymphangitis per person per month. At the end of treatment 6 persons still had attacks (average of 0.37 attacks per person per month for the group of 20 people). At three months 7 patients still showed attacks (0.80 attacks per person per month). Six months later 5 patients out of 18 still suffered from attacks (average 1 per person per month). At the end of 1 year 5 out of 15 patients still had attacks (0.7 per person per month).

As regards the microfilarial count, 8 persons were initially microfilaria-positive. At the end of treatment 5 were microfilaria-positive; at 3 months after treatment 5 still had microfilariae but the numbers were

lower than previously. Six months later 4 out of 6 persons were positive. One year after treatment 1 out of 7 was still a carrier.

No toxic effects occurred during the treatment. This work indicates that suramin has a definite antifilarial action upon *W. bancrofti*, but the necessity for intravenous injection does not permit its easy use on a large scale or for prophylaxis.

[These results are interesting; but since a non-toxic effective treatment is available in diethylcarbamazine, the use of suramin for the treatment of bancroftian filariasis will seldom be indicated.] *F. Hawking*

SCHNEIDER, J. & HUSSON, R. A. Chimiothérapie des filarioses expérimentales. Résultats de recherches sur *D. blanci* et sur une filariose spontanée de cynocéphales d'Afrique Équatoriale action du T.W.Sb. [Chemotherapy of Experimental Filariasis. Studies on the Action of TWSb upon *Dipetalonema blanci* and upon a Spontaneous Filariasis of Baboons from Equatorial Africa] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 296-300.

Dipetalonema blanci, described by BALTAZARD *et al.* (*C.R. Acad. Sci.*, 1952, v. 234, 2115; *Ann. Parasit. Humaine et Comparée*, 1952, v. 27, 311), has been maintained in the laboratory in France for more than 3 years. When the infected animals (*Meriones*) were treated with diethylcarbamazine in a single dose of 500 mgm. per kgm. or in daily doses of 50 mgm. per kgm. for 10 days, the therapeutic effect was disappointing. Microfilariae did not disappear from the blood and the adult worms remained alive. Suramin also produced little effect. Attention was then turned to FRIEDHEIM's compound TWSb (antimony-a,a'-dimercaptopotassium succinate) [this *Bulletin*, 1955, v. 52, 56]. The maximum tolerated dose for gerbils is 500 mgm. per kgm. by intramuscular injection. Doses of 25 mgm. per kgm. daily for 14 days were well tolerated. The minimum effective therapeutic dose for *D. blanci* seemed to be 11 mgm. per kgm. daily for 5 days; 25 mgm. per kgm. daily for 6 days cured all animals, the microfilariae disappearing and the adults being killed. These results suggest that the compound should be tried against *Dipetalonema perstans* and *Onchocerca volvulus* in man.

Meanwhile, there was an opportunity to try it on a filariasis of baboons, which had been encountered during virus research at the Pasteur Institute. This seemed to be due to *D. vanhoofi*, which is similar to *D. perstans*. Diethylcarbamazine was not effective. TWSb was quite effective. It was given intramuscularly in doses of 10 mgm. per kgm. daily for 6 days to baboons weighing 1.5-3 kgm. In bigger animals, because of difficulty in giving repeated injections, a dosage of 50 mgm. per kgm. daily for 3 days was tried, but this was badly tolerated and the dosage was changed to 30 mgm. daily for 4 days. This treatment killed both the microfilariae and the adult worms, and 120 baboons have been

treated in this way. [It would certainly seem desirable to test this compound against *O. volvulus* and *D. perstans* in man.] F. Hawking

BUDDEN, F. H. The Epidemiology of Onchocerciasis in Northern Nigeria.

Trans. Roy. Soc. Trop. Med. & Hyg. 1956, July, v. 50, No. 4, 366-78, 1 fig. & 1 map. [19 refs.]

This article reports the findings of a survey of the incidence and causes of blindness in the 12 provinces of Northern Nigeria. In addition, the populations of 15 endemic foci of onchocerciasis in the region were examined as to visual acuity and by skin snip to determine the incidence of infection and of reduced vision in relation to age and sex. In the survey of the provinces, among the 5,170 persons encountered with reduced vision were 1,789 who were blind as judged by inability to count fingers at distances greater than 3 metres. Excluding persons from endemic areas "onchocerciasis was the cause of blindness in 2 per cent. of the 1,076 blind examined in non-endemic areas, and since it is estimated that the blindness rate in Northern Nigeria is of the order of 1 per cent. it is concluded that onchocerciasis is the cause of blindness in about 0.2 per 1,000 persons living in non-endemic areas", these being emigrants from endemic areas.

Onchocerciasis is present up to the northern limit of *Simulium* breeding at about 13°N. No correlation was found between the biting rate of the vector and the incidence and intensity of infection. The number of cases of onchocerciasis and of blindness resulting in Northern Nigeria is roughly estimated at more than 339,000 persons infected and 19,400 blind; blindness rates up to 10 per cent. were encountered in the more heavily infected villages.

Though light endemicity appeared to have little effect on the wellbeing of a community, heavy endemicity led to a reduction in population density, probably because of the high rate of blindness. This depopulation may permit encroachment by tsetse. Onchocerciasis is regarded as of considerable economic importance in Nigeria because of the depopulating effect of heavy endemicity and because some 13,000 of the estimated 20,000 people blind as a result of onchocerciasis are of working age. [See also this *Bulletin*, 1952, v. 49, 896.] T. H. Davey

EDWARDS, E. E. Human Onchocerciasis in West Africa with special reference to the Gold Coast. *J. West African Sci. Ass.* 1956, Feb. 1, v. 2, No. 1, 1-35, 1 map. [Numerous refs.]

This article deals briefly but comprehensively with all aspects of its subject. The literature concerning onchocerciasis in the Gold Coast, its history, distribution, pathology, transmission, the parasite and its vector, is reviewed, and the author's own observations are given. These are

mainly concerned with the vector (*Simulium damnosum*) and some interesting findings are recorded. Larvae have been found in Gold Coast rivers as far as 30 to 50 miles from the site of egg deposition and have been noted breeding in placid water flowing at $1\frac{1}{2}$ miles per hour. Breeding appears to continue throughout the year in some areas but reductions in the density of adult *Simulium* are associated with water levels above and below the optimum.

The survival of the vector in areas where the streams dry up for several months, as in the Northern Territories, is discussed. The adult flies disappear and repopulation must result from survival in the immature stages or, less probably, by infiltration of adults from perennial foci which are sometimes 100 miles or more distant. Some experiments were carried out with the immature stages. Pupae could be kept alive on damp blotting paper for 4 to 5 days at which time either hatching occurred or the insect died. Larvae could not survive desiccation and died even in stagnant water or damp sand. Survival in the egg is the most probable answer, according to the author, because 3 larvae were recovered on immersing samples of the top layers of river beds which had been dry for at least 3 months; of these one died, one pupated and died, and from the third an imperfect adult hatched. Further experiments of this nature failed.

In the section dealing with control, insecticidal smokes are stated to be successful against the adult flies.

T. H. Davey

LEWIS, D. J. **Notes on Simuliidae in the Sudan** [Diptera]. Reprinted from *Bull. Soc. Entom. Egypte*. 1956, v. 40, 109-18, 2 figs. [14 refs.]

The author accepts changes in the names of simuliids as proposed in the standard work on Ethiopian Simuliidae by FREEMAN and DE MEILLON [this *Bulletin*, 1954, v. 51, 323], and the following names in his earlier papers on Sudan species are changed as follows, the new name being given in brackets: *Simulium alcocki* var. *henrardi* (*S. alcocki*), *S. rotundatum* (*S. unicornutum* form *rotundum*), *S. nigratarsis* (*S. aureo-simile*), *S. elgonense* (*S. medusaeforme* var. *hargreavesi*) and *S. lepidum* (*S. vorax*); a variation of *S. griseicolle* is known as *S. g.* form *bifila*.

The paper provides additional biological facts for some species, particularly *S. griseicolle* and *S. damnosum*, and distribution data for others. Green filamentous algal growths on the rock surfaces at Fola Rapids may be the reason for a scarcity of simuliids; there are grounds for concluding that larval attachment is made difficult by the presence of the alga. Emergence of *S. griseicolle* occurs mainly in the morning hours of daylight. A blood meal is probably not necessary for oviposition. A previous record of a 200 mile dispersal of this species is now thought to be more likely 60 miles. *S. damnosum* is not likely to be a serious problem at a

dam proposed at the Damasin rapids. Sixteen species of Sudan simuliids, including *S. griseicollis* and *S. damnosum*, were absent from an isolated mountain massif in western Sudan. D. S. Bertram

BLANC, M. Compte rendu sommaire d'une mission hydrobiologique en Haute-Volta (Février-Mars 1956). [**Summarized Results of a Hydrobiological Enquiry in Upper Volta, French West Africa in 1956**] *Méd. Trop.* Marseilles. 1956, May-June, v. 16, No. 3, 418-21.

Experiments in the control of breeding of *Simulium* by the application of BHC in the water resulted in considerable destruction of fish [this *Bulletin*, 1956, v. 53, 1160] and a special enquiry into the matter is here reported on. It was shown by tests on carefully metred waters that indigenous fish could withstand a concentration of 8 mgm. DDT per litre maintained for nearly 2 hours and applied as a suspension of a wettable powder, whereas a concentration of half this strength for 30 minutes was sufficient for the destruction of *Simulium* larvae. It is therefore concluded that DDT may be safely used for this purpose provided that there is a careful measurement of the water flow at each treatment and that the DDT is tested each time to check the dose and the state of preservation of the formulation.

Study was also made of the waters and fish resources of the Upper Volta, the full report being made elsewhere and briefly referred to here. It is noted that very little effort is made to develop or use the fish supplies which could be a good source of food. Only one place was found where important catches are made—the "Hippopotamus Pond" where Sudanese pursue the fish with net, spear and line, collecting some 600 kgm. daily in the dry season. Other sources exist but are not exploited.

G. Macdonald

BUMBALO, T. S. & GUSTINA, F. J. **The Treatment of Pinworm Infection (Enterobiasis) with Gentian Violet Suspension.** *J. Pediatrics.* St. Louis. 1955, Sept., v. 47, No. 3, 311-14.

The value of gentian violet (methylosaniline) in the treatment of enterobiasis has already been established [this *Bulletin*, 1941, v. 38, 156]. The authors took a group of 40 children aged 3 to 16 years of whom 26 had been shown to be infected with *Enterobius vermicularis* and 14 to be negative, by a modification of the Graham Scotch-tape technique (anal swab). Without previous preparation they were given a phenolphthalein salt suspension of gentian violet containing 6 mgm. of gentian violet per ml. Children aged 3 to 5 years received a "flat" teaspoonful twice daily, those aged 6 to 10 received a rounded teaspoonful thrice daily, and those aged 11 to 16 years received 1½ teaspoonfuls thrice daily, for 14 days. The estimated daily dose for the children of the first two groups was

48 mgm., and 90 mgm., respectively, and [presumably] that of the third group 135 mgm. Seven days after the last dose 2 anal swabs were taken daily for 7 days.

In 21 of the 26 infected children 14 negative swabs were obtained, and in 3 more, although the first or second days' swabs were positive, the subsequent swabs were negative. The 14 negative cases remained negative. The cure rate was thus 81 per cent., or 92.3 per cent. if the 3 additional patients are assumed to have been cured.

The gentian violet suspension was well accepted by the children and well tolerated; no nausea or vomiting occurred in any of the children.

L. E. Napier

DEFICIENCY DISEASES

STUART, K. L. & BRAS, G. **Veno-Occlusive Disease of the Liver in Barbados. Case Reports.** *West Indian Med. J.* 1956, Mar., v. 5, No. 1, 33-6, 2 figs. on pl. [12 refs.]

This paper reports 3 cases of veno-occlusive disease of the liver observed in children in Barbados. The condition differed in no way from that studied previously by the authors in Jamaica [this *Bulletin*, 1955, v. 52, 1219].

R. Passmore

WATERLOW, J. C. & WEISZ, T. **The Fat, Protein and Nucleic Acid Content of the Liver in Malnourished Human Infants.** *J. Clin. Investigation.* 1956, Mar., v. 35, No. 3, 346-54. [39 refs.]

Chemical analyses of biopsy specimens of the liver from a group of malnourished infants showed a great excess of fat, a slight and doubtful increase in water, and a high concentration of glycogen. The protein, ribosenucleic acid (RNA) and deoxyribosenucleic acid (DNA) content of the specimens was measured. Biopsy specimens were repeated after 1 or 2 months on a high protein diet. On the assumption that the amount of DNA per cell and per liver remains constant, the results show that on admission these children had lost an average of at least 40 per cent. of their liver protein and RNA.

R. Passmore

LEWIS, R. A., BHAGAT, M. P., WAGLE, M. M., KULKARNI, B. S. & SATOSKAR, R. S. **Antibiotic Dietary Supplements in the Therapy of Childhood Protein Malnutrition.** *Amer. J. Trop. Med. & Hyg.* 1956, May, v. 5, No. 3, 483-96, 3 charts. [24 refs.]

In a hospital in Bombay 2 groups (each of 10 children) suffering from protein malnutrition received the same dietary treatment based on cow's

milk (details not given). One group received in addition daily 25 mgm. of aureomycin or oxytetracycline. The children were followed for periods of up to 7 weeks. Serum albumin levels rose 0.59 gm. per cent. in the controls and 1.54 gm. per cent. in those receiving antibiotics. Antibiotics were also associated with a higher rate of regeneration of haemoglobin and with a fall in high levels of serum globulin in some children. Practical and theoretical aspects of the use of small doses of antibiotic as nutritional supplements in the treatment of protein malnutrition are discussed [see also this *Bulletin*, 1956, v. 53, 478].

R. Passmore

DEAN, R. F. A. **Advances in the Treatment of Kwashiorkor.** *Bull. World Health Organization*. Geneva. 1956, v. 14, No. 4, 798-801.

The treatment of kwashiorkor is often complicated by the onset of diarrhoea. In some infants this is due to an intolerance of carbohydrate and especially lactose. In a search for a cheap local source of calories, cotton-seed oil was found to be valuable and not associated with gastrointestinal disturbances. Biscuits made from the following mixture have proved of value in the hospital wards at Kampala for many months.

Ingredients	Amount gm.	Protein Calories	Total Calories	E. African cents per 100 Calories
Ground nuts (toasted and ground) ...	150	164	840	2.88
Wheat flour	50	20	182	2.74
Maize flour	100	37	355	1.82
Cotton-seed oil	25	—	220	2.50
Sugar	75	—	288	3.12

Of the total calories, only 11.5 per cent. are from protein. A higher percentage would be desirable. Nevertheless the biscuits, as they are, are valuable not only in the treatment of hospital patients, but also when given to primary schoolchildren.

R. Passmore

KAHN, E. & FALCKE, H. C. **A Syndrome simulating Encephalitis affecting Children recovering from Malnutrition (Kwashiorkor).** *J. Pediatrics*. St. Louis. 1956, July, v. 49, No. 1, 37-45, 2 figs. [14 refs.]

This is a fuller account of the syndrome already described [this *Bulletin*, 1954, v. 51, 1090]. Details of its manifestation in 8 children are given. Coarse tremors, postural abnormalities, exaggerated tendon reflexes and myoclonus were constant features. The children were aged 7½ months to 3 years. All were weaned on an inadequate diet, based on maize porridge. Only 3 had a little milk. Laboratory investigations showed that the cerebrospinal fluid was normal, serum albumin levels were low and a mild normocytic anaemia was usually present. Serum sodium, potassium and calcium levels were normal. The signs disappeared in a few weeks on

dietary therapy. The cause of the syndrome remains obscure and it is not understood how a few only of the many malnourished infants in Johannesburg develop it.

R. Passmore

HAEMATOLOGY

Foy, H. & KONDİ, Athena. **Anaemias in Africans.** *Central African J. of Med.* 1956, July, v. 2, No. 7, 254-7. [22 refs.]

The authors give a lucid summary of the anaemias they have encountered in Africa. They note that although the variable incidence of different forms of anaemia is an important feature, none, with the possible exception of the anaemia associated with onyalai, is peculiar to Africa. Although local practitioners will be familiar with the prevalent forms of anaemia a certain diagnosis can only follow full haematological investigations. A high reticulocyte level may incorrectly suggest macrocytosis and marrow examination is essential before macrocytosis is attributed to a megaloblastic anaemia.

Megaloblastic anaemias fall into 3 groups:

(a) Pernicious anaemia, which is rare in Africans. The authors made the diagnosis in 3 cases, all having histamine-fast achlorhydria. In 2 patients response to either penicillin or oral B12 occurred in early stages, indicating that some intrinsic factor was present. With extension of the gastric atrophy response occurred only to intramuscular B12.

(b) Anaemias with free acid in the gastric juice and responding to penicillin or oral B12 indicating the presence of intrinsic factor. Some cases, presumably owing to concomitant iron deficiency, may be microcytic and hypochromic although megaloblastic.

(c) Anaemias failing to respond to penicillin or to B12 orally or intramuscularly but responding to folic acid by mouth. These cases have high serum B12 levels and show normal absorption of radio B12. These cases appear to correspond to those described by WILLS *et al.* in India [*Bull. Hyg.*, 1930, v. 5, 835; 1931, v. 6, 11, 12].

Those in group (b) appear to be due to a low dietary B12, perhaps exaggerated by an intestinal flora which competes for the B12, as they respond to penicillin which may destroy the competitors and release their B12. Bulky carbohydrate is usually the main item in the diet. The absence of other signs of nutritional deficiency is notable and suggests the defective diet may be responsible for an abnormal flora rather than be completely lacking in B12. There are striking seasonal variations in the incidence of the megaloblastic anaemias.

Microcytic iron deficiency anaemias are common. Giant stab-cells are

sometimes present in the marrow which is hyperplastic but not megaloblastic. The exact relationship of these anaemias to intestinal helminthic infections, especially hookworms, is still uncertain. Where iron cooking pots are used the incidence of iron deficiency anaemias is reduced [this *Bulletin*, 1954, v. 51, 300].

Haemolytic anaemias include sickle-cell anaemia and familial haemolytic jaundice and a little-understood group of splenic anaemias. The authors suggest that such diseases as kala azar, malaria and schistosomiasis produce splenomegaly and a splenic haemolytic anaemia leading to liver damage. A dramatic response in proved cases in this group usually follows splenectomy. [It would be of interest to know if any cases of pernicious anaemia due to a genetic defect rather than to atrophic gastritis have been found in Africans.] *Frederick J. Wright*

INGRAM, V. M. **A Specific Chemical Difference between the Globins of Normal Human and Sickle-Cell Anaemia Haemoglobin.** *Nature*. 1956, Oct. 13, v. 178, 792-4, 2 figs. [12 refs.]

CHAPLIN, H., Jr., KEITEL, H. G. & PETERSON, R. E. **Hematologic Observations on Patients with Sickle Cell Anemia sustained at Normal Hemoglobin Levels by Multiple Transfusions.** *Blood*. 1956, Sept., v. 11, No. 9, 834-45, 6 figs. [18 refs.]

“(1) Three sickle cell patients were sustained at normal hemoglobin levels for 3-4 months by means of repeated transfusions of fresh blood.

“(2) In response to transfusions, there was a decline in reticulocytes to normal levels during the first 5-7 days of observation. During periods in which the hemoglobin was maintained at high-normal or super-normal levels, the reticulocyte values were depressed below the normal range. A distinct reticulocyte response was observed when the hemoglobin declined to approximately 11.0 Gm. per cent following cessation of transfusions.

“(3) Employing anti-M differential agglutination, a simple exponential decline was observed in the number of sickle cells in each patient's circulation during the period of sustained normal hemoglobin concentration.

“(4) The continued production of new sickle cells during the first week of observation complicated the interpretation of the differential agglutination data, but provided indirect evidence for the presence of an especially short-lived proportion of the patient's cells. Support for this concept was derived from the radioactive iron utilization studies performed in Case 1.”

KEITEL, H. G., THOMPSON, D. & ITANO, H. A. **Hyposthenuria in Sickle Cell Anemia: a Reversible Renal Defect.** *J. Clin. Investigation*. 1956, Sept., v. 35, No. 9, 998-1007, 5 figs. [29 refs.]

The authors accept and confirm previously published evidence of hyposthenuria (inability to produce a concentrated urine) in sicklaemics. The disability was found not only in patients with sickle-cell anaemia but also in sickle-cell trait carriers; it was found in sickle-cell thalassaemia, but not in haemolytic anaemia not associated with sickling, or in haemoglobin C disease. Thus in 24 non-sickling control subjects of whom 12 were white and 12 Negroes the mean value of the maximally concentrated urine was 1,055 mOsm/l. with a standard deviation of only ± 118 . The symbol mOsm/l. used to designate the solute concentration of urine represents that concentration which results in a freezing point depression of 1.86×10^{-3} degrees C. and is equivalent to a solution containing one millimole of "ideal" solute per 1,000 gm. of water. Of 29 sickle-cell anaemia patients 13 were above the age of 7; of these 11 had received no previous blood transfusion, and none of them achieved a concentration above 500 mOsm/l. Two had previously been transfused and were able to concentrate to 510 and 502 mOsm/l. respectively. Seven of the patients below the age of 7 also did not achieve concentrations above 500 mOsm/l.; the highest value was 767 mOsm/l. seen in a 4-year-old child. Of 26 subjects with sickle-cell trait only 8 achieved a urine concentration within the 95 per cent. range of normal. Multiple blood transfusions raised the concentration of the urine; thus in 4 children with sickle-cell anaemia the maximum ability to concentrate urine increased from 553 to 682 mOsm/l. before transfusion to 942 to 1,042 mOsm/l. after transfusion. However, this effect could only be associated with a dilution of the sickle-cells in the blood and not with an overall rise in haemoglobin level. Thus non-sickling patients with haemolytic anaemia had no hyposthenuria, nor were the hyposthenuric sickle-cell trait carriers anaemic. There was also no connexion between haemolysis and hyposthenuria. Some of the non-sickling patients with haemolytic anaemia and the subject with haemoglobin C disease had more free haemoglobin in their plasma than the sickle-cell anaemia patients. There was, of course, no increased haemolysis in the hyposthenuric sickle-cell trait carriers.

McRORY *et al.* (*Amer. J. Dis. Children*, 1953, v. 86, 512) have suggested that the concentration defect in sickle-cell anaemia was due to a resistance to anti-diuretic hormone. The present authors cannot confirm this; injection of pitressin had in their hands some effect on the urinary concentration in 2 patients with sickle-cell anaemia. The most likely explanation of their findings is, according to the authors, a renal damage due either to intravascular sickling or to the presence of sickle-cell haemoglobin in renal tubular cells.

[These observations are of considerable importance not only for the treatment of sickle-cell anaemia patients but also from the point of view of population genetics. If sickle-cell trait carriers are at a disadvantage compared with non-sicklers, considerations of balanced polymorphism will have to take this into account, particularly in dry climates.]

H. Lehmann

NEEL, J. V., HIERNAUX, J., LINHARD, J., ROBINSON, A., ZUELZER, W. W. & LIVINGSTONE, F. B. **Data on the Occurrence of Hemoglobin C and other Abnormal Hemoglobins in some African Populations.** *Amer. J. Human Genetics.* 1956, Sept., v. 8, No. 3, 138-50, 1 fig. [47 refs.]

"Data are presented concerning the distribution of hemoglobin types in Africa, as determined by paper electrophoresis of blood specimens obtained in Ruanda-Urundi and the eastern Belgian Congo, in Liberia, and in the Dakar region of French West Africa. On the basis of these data, plus the other similar studies to date, a map has been constructed of the distribution in Africa of individuals heterozygous for the gene responsible for the formation of hemoglobin C. The implications of the distribution exhibited by this gene are discussed."

VENOMS AND ANTIVENENES

TWEEDIE, M. W. F. & REID, H. A. **Poisonous Snakes in Malaya.** *Malayan Museum Pamphlets. Popular Pamphlet No. 11.* 16 pp., 11 figs. 1956. Singapore: Govt. Printer. [50 cents.]

This short pamphlet gives a popular account of the poisonous snakes of Malaya, their identification, the symptoms of poisoning by their venoms and the suitable methods of treatment. The risk from snake bite in Malaya is not considered to be high. Poisonous snakes are nowhere abundant and except perhaps in the northern-most part of the country the Russell's viper, which is responsible for many deaths in India, does not occur.

The terrestrial snakes of Malaya total 111 species, of which 16 are venomous, but only 5 species are really dangerous to life. There are also 17 species of sea-snakes, all venomous, around the coasts. The most dangerous land snakes are the common cobra and the king cobra (hamadryad) and 3 species of krait. Of the kraits the Malayan krait (*Bungarus candidus*) is known to cause fatal poisoning but there do not appear to be records of fatal poisoning by the other 2 species (*B. fasciatus* and *B. flaviceps*) although they must be presumed to be dangerous. Other Elapid snakes found are 4 species of coral snakes, but although they have poison glands they are unable to bite effectively and present no real risk.

The vipers of Malaya all belong to the group known as pit vipers, having the characteristic pit on the side of the head between the eye and the nostril. They are among the commonest poisonous snakes of Malaya and bites from them are not infrequent, but as the action of their venoms is purely local they do not cause fatal effects.

The sea-snakes of the littoral, which are numerous, belong to two sub-families, the Laticaudinae and the Hydrophiinae, distinguished by the differences in their belly scales. All are poisonous but they are unaggressive and experience has shown that they present little risk in open waters. They may, however, bite when trodden on in shallow estuarial waters and fatalities are not uncommon as the venom is of high toxicity.

A key, based on scale characters, is presented which will enable a snake to be identified as poisonous or non-poisonous. A short account is given of snake poisoning and how to deal with it. This includes the determination of whether a bite is likely to have been caused by a poisonous and dangerous species, a description of symptoms produced by the venoms of Viperine and Elapine snakes respectively, and the suitable methods of treatment of bites by either type.

John Taylor

RIBEIRO, L. P., MITIDIERI, E. & VILLELA, G. G. **Paper Electrophoretic and Enzymatic Studies on Blood Serum, Venom and Liver of "Bothrops jararaca"**. *Mem. Inst. Oswaldo Cruz*. 1955, June-Sept.-Dec., v. 53, Nos. 2, 3 & 4, 487-97, 4 figs. [28 refs.]

WIENER, S. **The Australian Red Back Spider** (*Latrodectus hasseltii*).

II. Effect of Temperature on the Toxicity of Venom. *Med. J. Australia*. 1956, Sept. 1, v. 2, No. 9, 331-4, 1 fig. [13 refs.]

"1. The body temperature of mice varies with that of the external environment.

"2. At 0° and 37°C. the toxicity of the venom of the red back spider is 100 times greater than at 18° to 24°C.

"3. The possible causes of this effect are discussed, and its application for the assay of spider venom and antivenene is suggested."

[See this *Bulletin*, 1956, v. 53, 1273.]

HANEVELD, G. T. Beten door reuzenduizendpoten van Nieuw-Guinea (*Scolopendra morsitans* en *Sc. subspinipes*). [**The Bite of the New-Guinea Giant Centipede** (*Scolopendra morsitans* and *Sc. subspinipes*)] *Nederl. Tijdschr. v. Geneesk.* 1956, Oct. 13, v. 100 (iv), No. 41, 2906-9. [12 refs.]

The English summary appended to the paper is as follows:—

"New-Guinean species of the giant centipede often inflict painful bites. Description of three cases with local symptoms of immediate agonizing pain, infection of the bite and lymphangitis. Both pain and infection diminish after a few days. In the above-mentioned cases the inflammation returned for a short time after about a week. In rare cases there are paralyses or contractures and heart-irregularities. The poison-apparatus

of *Scolopendra* consists of a poison gland, a poison-duct and a pair of pierced fangs. The venom shows a strong paralysing and necrotising effect on small laboratory animals. The treatment is the same as for snake-bites: ligature, incision, suction and application of ammonia, if necessary followed by local anaesthetics or morphiaum."

TOXOPLASMOSIS

RAWAL, B. D., JHALA, H. I. & PATEL, R. J. **A Survey of the Incidence of Toxoplasmosis in Bombay.** *J. Indian Med. Ass.* 1955, Oct. 1, v. 25, No. 9, 351-4.

The authors undertook this study with the object of ascertaining the extent to which toxoplasmosis occurred in man in India.

They obtained the RH strain of *Toxoplasma* and passaged it in mice. Sufficient antigen was not obtained by this method and they therefore prepared this by egg inoculation. The dermal test was carried out by the injecting of 0.1 ml. of prepared antigen into the skin of the forearm, with a control injection into the other arm, the latter being made from uninoculated chorio-allantoic membrane.

A reading was taken after 48 hours; 10 to 30 mm. of induration and erythema was taken as a positive reaction.

The persons tested were as follows: young adults (100), blind children (50), blind adults (250), hospitalized children (10), patients with chorioretinitis (8) or with iritis (10), hydrocephalic children (5). The positive incidence in the first 4 groups was just under 2 per cent. Of the patients, 7 out of 8 with chorioretinitis, 2 out of 5 with hydrocephalus and none with iritis showed positive results.

The complement-fixation test with antigen prepared from heavily infected chorio-allantoic membrane was carried out with blood from 18 positive skin-reactors, 48 pregnant women, 1 patient with chorioretinitis, and 100 sheep. In one case only, the patient with chorioretinitis who also gave a positive intradermal reaction, was the test positive.

The dye test was done in 5 cases: these were all suffering from chorioretinitis. The titre was 1 in 16 in one case and 1 in 64 in the rest. This titre is not significant.

Pristimerin prepared from *Pristimera indica* was used in the treatment of toxoplasmosis in mice, without success. L. E. Napier

UDANI, P. M. **Toxoplasmosis.** *Indian J. Child Health.* 1956, Aug., v. 5, No. 8, 371-80. [14 refs.]

A study of 66 children, in 11 of whom the toxoplasmin skin test was positive. In 4 children, the dye test was positive.

GRANDJEAN, L. C. Toxoplasmose og tumor malignus colli. [**Toxoplasmosis and Malignant Tumour**] *Nordisk Med.* 1956, Sept. 27, v. 56, No. 39, 1421-3, 3 figs.

The English summary appended to the paper is as follows:—

“A case of coexistent acquired toxoplasmosis and malignant tumor, probably perithelio-sarcoma, is reported. The case was intractable and presented great diagnostic difficulties.”

HARANT, H., BÉTOULIÈRES, P., RIOUX, J. A. & PLANE, J., with the technical collaboration of A. BRÈS. Un cas de toxoplasmose pulmonaire canine. [**A Case of Pulmonary Toxoplasmosis in a Dog**] *Montpellier Méd.* 1956, May, v. 49, No. 5, 482-93, 2 figs. [52 refs.]

TOLENTINO & BUCALOSSÌ, **La toxoplasmosi.**

This book is reviewed on p. 108.

DERMATOLOGY AND FUNGUS DISEASES

MANDOUL, R., HADIDA, E. & SABATIER, J. Dermite érythémato-papuleuse provoquée par *Eotetranychus telarius* L. [**Erythemato-Papular Dermatitis from *Eotetranychus telarius***] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 303-5, 1 fig. on pl.

DAS, A. K., CHATTERJEE, M. K. & DEB SIKDAR, B. M. **A Case of Coccidiomycosis in India.** *Calcutta Med. J.* 1956, Aug., v. 53, No. 8, 272-6, 4 figs. on pl.

A 29-year-old married woman was found to be suffering from suppurating and discharging granulomatous lesions on the left foot, both thighs, front of chest, back and abdomen. The general clinical picture suggested actinomycosis, but the characteristic “sulphur” granules were not found in the pus.

The diagnosis of coccidioidomycosis was based on the discovery of “large round bodies about 4 to 5 times the size of a pus cell”, which “had a double contour wall and enclosed smaller-shaped bodies inside”, and were considered to resemble the spherules of *Coccidioides immitis*.

As coccidioidomycosis is not known to occur in India, the authors suggest that the infection may have been conveyed by fomites imported from some endemic centre of the disease in America, but no evidence of this mode of infection is put forward in the present case, except, perhaps, that the woman's husband “stayed in California for some-time during the

last war", and there may have been some subsequent connexion, not mentioned.

The lesions seemed to respond to X-ray therapy but the patient was lost to sight before treatment was completed.

[The discovery of autochthonous coccidioidomycosis in India would be a matter of great importance, but the diagnosis of the disease must be unequivocal. In the present case, the diagnosis rests solely on the presence of cells thought to resemble the spherules of *C. immitis*, in the lesions. There was no culture of the fungus, and materials were not available for the skin sensitivity and serological tests for coccidioidomycosis. The photomicrograph of the supposed coccidioidal cells is of poor quality but the cells, in the opinion of the abstractor, do not resemble those of *C. immitis*.]

J. T. Duncan

LACAZ, C. da S. & NETTO, Celeste F. Contribuição para o estudo dos agentes etiológicos da maduromicose. [**Contribution towards the Study of the Aetiological Agents of Maduromycosis**] *Folia Clin. et Biol.* S. Paulo. 1954, May, June & Nov.-Dec., v. 21 & 22, Nos. 5, 6 & 5/6, 331-52; 411-32; 301-37, 24 figs. [Numerous refs.] English summary.

In this detailed and critical review of the literature on maduromycosis (as distinguished from the nocardial type of mycetoma), the authors have made a close examination of the aetiological status, and the taxonomy and nomenclature of 38 species of fungi alleged to be capable of causing mycetoma in man. They conclude that in this connexion the genera *Monilia*, *Mortierella*, *Penicillium* and *Mucor* occur merely as contaminants; *Indiella* is *nomen dubium et confusum*; *Glenospora*, in reports on mycetoma, is difficult to characterize from the poor and inadequate descriptions presented; *Aspergillus bouffardi* and *A. mycetomi* are not valid species; *Madurella mycetomi* has been pronounced *nomen dubium* by MACKINNON [this *Bulletin*, 1952, v. 49, 994] and, although later revalidated by Mackinnon, is now relegated to the synonymy of *Madurella tozeuri* which the present authors accept as a valid species.

The identification of the fungus species should not be made merely on the characters of the parasitic grain or colony of the organism as it is seen in the lesion, but must be based on the morphology of the fungus in culture. Physiological tests for identity, such as the power to assimilate certain compounds as sources of essential carbon and nitrogen, are often untrustworthy.

The following are accepted as good species and authentic causes of mycetoma: *Allescheria boydii*, *Monosporium apiospermum*; *Madurella tozeuri* and *M. grisea*; *Cephalosporium recifei* and *C. falciforme*; *Aspergillus amstelodami*, *A. nidulans* and *A. fumigatus*; *Acremonium potronii*, *Acremoniella lutzi*, *Phialophora jeanselmei*.

The authors feel that "visceral mycetoma" should be accorded more

attention by pathologists. The instances of this condition quoted were all of pulmonary localization and were caused by species of *Aspergillus*.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

BOUVET & AHECORO. Le dépistage du trachome dans un groupe d'écoles primaires à Dakar. Réflexions sur l'épidémiologie et quelques problèmes soulevés par ce dépistage. [**Reflexions on the Ways of Trachomatous Infection in Central Africa and specially in Dakar**] *Rev. Internat. du Trachome*. 1956, v. 33, No. 3, 457-67.

YUGE, T. & KASHI, T. **Studies on the Fixed Trachoma Virus (FTV) of Arakawa and Kitamura. First Part. Complement Fixation Test in Trachoma with the FTV.** *Rev. Internat. du Trachome*. 1956, v. 33, No. 3, 410-19. [20 refs.]

"1. The complement fixation test of trachoma sera using FTV of Arakawa and Kitamura as antigen was carried out, the antigen being prepared by ultra-centrifugation, freezing and thawing of the virus material.

"2. Of 81 cases of apparent trachoma, in 46 was the test positive. In 15 cases of control subjects all but one doubtful case was negative. In one case of Behcet disease and in 4 cases of kerato conjunctivitis epidemica, suggesting viral diseases was the test also negative.

"3. There were no significant differences among Tr. I, Tr. II, and Tr. III, although it seemed that the rate of positive cases was the highest in Tr. IIa, and the lowest in Tr. III.

"4. The results of the complement fixation test with the fixed inclusion blenorrhoea virus in cases of trachoma with negativeness by FTV tests were also negative.

"5. The problem of the identity of the inclusion blenorrhoea and trachoma relating the test was briefly discussed.

"6. The identification of FTV of Arakawa and Kitamura with the trachoma virus was verified."

UENO, H., SIMIZU, E., GOTO, T. & TAKAHASHI, H. **Study of the Fixed Trachoma Virus F.T.V. of Arakawa and Kitamura. Second Part. Histo-Pathological Observation of Organs of Infected Mice.** *Rev. Internat. du Trachome*. 1956, v. 33, No. 3, 385-93, 6 figs.

"(1) The fixed trachoma viruses which were obtained by repeated passage through mice, were injected intracerebrally into 10 young mice and intraperitoneally into 5 mice.

"(2) The recognized histo-pathological pictures of brain, lung and liver

of infected mice are considered as changes due to virus. The brains present the picture of viral meningo-encephalitis; the lungs that of interstitial pneumonia; the livers show degeneration of liver cells.

"(3) When the inoculation is done intracerebrally, the cerebral change appears more intensive than changes following intraperitoneal inoculation, but both inoculations induce almost the same changes in lung and liver in spite of the difference in technique.

"(4) The infection caused by this fixed virus in mice can be considered a systemic disease and it is proved that this infection is produced by viremia."

MORI, N. **Etiological Investigations of Trachoma: Serial Passage through Rabbit Testicles.** *Rev. Internat. du Trachome.* 1956, v. 33, No. 3, 431-56, 18 figs. [11 refs.]

FEIGENBAUM, A., LANDAU, J., GUREVITCH, J. & SHAMIR, R. **The Bacterial Flora of the Conjunctiva in Patients with Active and Cicatrized Trachoma and its Seasonal Variations in Israel.** *Rev. Internat. du Trachome.* 1956, v. 33, No. 3, 363-73, 1 chart. [16 refs.]

"The bacterial flora of the conjunctiva of group of trachomatous children in the various stages of the disease was examined during the 4 seasons of the year.

"The two main organisms found were staphylococcus albus and diphtheroids which are also the common finding in the normal conjunctiva. Haemophilus influenzae and H. aegyptius were found in small numbers during the hot period of the year. H. aegyptius was isolated on 4 occasions from 3 children who had to be considered carriers. Sterile findings were less frequent than in the conjunctiva of healthy people and leprous patients. A curve drawn of the sterile findings during the four seasons conform almost exactly with the inverted curve of the monthly mean temperature.

"Mixed infections were found in an average of 32%. The trachomatous conjunctiva seems to be more susceptible to mixed contaminations which tends to aggravate the inflammatory conditions.

"The trachomatous process is favourably influenced by treatment with antibiotics (aureomycin) which lowers the number of these secondary infections."

TORFEH, H. L'efficacité de la chloromycétine dans le traitement du trachome. [**Efficiency of Chloramphenicol in the Treatment of Trachoma**] *Rev. Internat. du Trachome.* 1956, v. 33, No. 3, 424-30.

The English summary appended to the paper is as follows:—

"The author experimented a cure of the trachoma by chloromycetin in the service of this hospital and noted its unquestionable efficiency after

14 to 45 days (total dose: 25 to 35 gm). He recommends intramuscular injections of 1 to 2 gm daily together with ointment instillations twice daily. He never detected any allergic accidents."

HEAT STROKE AND ALLIED CONDITIONS

KENNEY, R. A. & WATKINS, E. S. **A Comparison of the Tilt-Table Responses of Africans and Europeans resident in the Tropics.** *West African Med. J.* 1956, Sept., v. 5 (n.s.), No. 3, 112-17, 3 figs.

With the object of investigating environmental adaptation the responses were studied of 50 Africans and 50 Europeans of comparable age range to positional stress on a tilt-table. Blood pressures (BP) and pulse rates (P) were taken at the end of a 30 minutes' rest horizontally on the table and immediately after tilting to 70° from horizontal.

Of the Europeans 5 fainted after tilting and 5 showed premonitory syncopal signs, excessive pallor, restlessness, swallowing and sweating, tachycardia and BP fall. None of the Africans fainted or showed prodromal syncopal signs.

The overall pattern of response was similar in both races: P, diastolic BP rise and systolic BP showed no consistent change.

In 4 African subjects who had raised body temperatures as the result of prior exposure to heat the increment in P due to tilting was superimposed on that associated with pyrexia. M. L. Thomson

MACFARLANE, W. V. **Urinary Sodium-Potassium Ratios in Hot Environments.** *Med. J. Australia.* 1956, July 28, v. 2, No. 4, 139-40, 1 fig.

The effect was studied of thermal stress on urinary sodium-potassium ratios in 3 types of situations, *viz.* hot room exposures, transfers of persons from South to North Australia and seasonal changes in Brisbane.

Thermal stress reduced Na/K ratios in all cases from 2 or 3 to 1 or less than 1. With continued exposure the ratios tended to rise after a few days. High sodium excretion occurred for a few days after changing from hot to colder weather.

Highly acclimatized sugar cutters maintained a ratio of 2.33 during severe work at high temperatures.

Seven semi-sedentary workers showed a pronounced seasonal fluctuation in the ratio from a mean value of 2.6 in June to 1.5 in October, the hottest month. The difference between the ratios for the hottest and those for the coolest months was highly significant.

It is concluded that sodium is differentially retained in the heat to

form increased extracellular fluid and for sweat production, the agent responsible being in all probability aldosterone. *M. L. Thomson*

AUSTIN, M. G. & BERRY, J. W. **Observations on One Hundred Cases of Heatstroke.** *J. Amer. Med. Ass.* 1956, Aug. 18, v. 161, No. 16, 1525-9, 1 fig.

Of 1,000 heat victims attending St. Louis (Missouri) City Hospital in 1952-4 178 were admitted to hospital and of these 100 cases of heat stroke were selected for analysis. The ratio of males to females was 3 to 2. All were white. [The authors give no indication whether the absence of non-whites reflects a racial difference in heat tolerance or in hospital admission policy.]

There was cardiovascular involvement in 84 per cent. Prior alcoholic intake was admitted in 30 per cent. There were 17 deaths, 7 occurring within 24 hours of admission.

The relation is given between environmental temperatures and admission rates. In these three hot summers there were respectively 68, 79 and 72 days with average temperature over 90°F. and mean humidity 50-60 per cent. Most cases were produced by high temperature, either the first hot day of the year or a later plateau of several days' duration.

Patients who showed hot dry skin and central nervous system signs were included although body temperature was less than 106°F. (41.1°C.). Dehydration and salt deficiency did not appear to be prominent in this series.

A systolic blood pressure less than 100 mm. Hg., body temperature over 106°F., central nervous system signs (particularly coma), elevated blood urea nitrogen and hyperkalaemia were of bad prognosis.

Treatment. The patients were totally immersed in an ice bath with vigorous massage until rectal temperature fell to 102°F. Oxygen was then administered and Arterenol (*nor*-adrenaline) where BP was less than 100 mm. Hg. Other treatment included fluid and electrolyte therapy, cortisone in patients with shock and pencillin in all comatose patients. *M. L. Thomson*

RENBOURN, E. T. **The Spine Pad: a Discarded Item of Tropical Clothing. An Historical and Physiological Survey.** *J. Roy. Army Med. Corps.* 1956, Oct., v. 102, No. 4, 217-33, 5 figs. on 3 pls. [92 refs.]

MISCELLANEOUS DISEASES

BARTEN, J. J. C. **Scleroma Respiratorium in Indonesia, particularly the Scleroma Endemic in North Celebes.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, June, v. 8, No. 2, 101-16, 8 figs. [36 refs.]

This subject has already been discussed by KOUWENAAR [see this *Bulletin*, 1956, v. 53, 1052]. So far 200 cases have been reported from Indonesia. SNIJDERS, who discovered the first case on the east coast of Sumatra, believed that the origin of this disease is concealed in antiquity in an old stratum of the population descended from the Munda-Kolaric tribes of the Chota-Nagpur tableland in N.E. India where rhinoscleroma also occurs.

A map portrays the scattered areas of scleroma in the Archipelago. There are 2 areas in Sumatra, 4 in Java, 1 in N. Celebes at Minahassa. Scleroma has been known to the general population for a very long time. Thus a *wayang* puppet has been found with a typical "Hebra" nose and the performer spoke with a nasal twang. In Kasuratan 44 cases are known, 19 of them women.

The first stage in mucopurulent rhinitis with hyperaemic swollen nasal mucosa and a mucopurulent secretion: this was observed in 16 young persons. Complement-fixation was positive in 12. In 3 the test was always negative, though bacteriological tests were positive: there were probably not sufficient antibodies in the serum to give a positive result in the initial stages.

Atrophic rhinitis was observed in 31. The mucous membrane is deep red in colour and covered by a tough, foetid coating: the conchae are atrophied and irregular.

Granulomata were seen in 22 patients. The tumours were small, no larger than a pea in 12 patients. In only 2 was the tumour visible and one of these patients had a Hebra nose. These granulomata may disappear.

Cicatrization and healing are sometimes local, though at other sites the process may be increasingly active. The disease may be considered healed when the symptoms of inflammation have disappeared and no scleroma bacilli can be cultivated. In most patients the disease is localized to the nose, though in others hoarseness and respiratory distress indicated that laryngeal changes were present.

On the whole the course of the disease in Kasuratan is light, but for every recognizable scleroma patient there were 20 with a "mitigated" process. A superficial examination tends to reveal the hypertrophic form whereas a more thorough investigation usually shows a preponderance of the atrophic form.

The familial character of the disease is obvious. An example of a clear connexion is shown in the family of one woman who transmitted the infection to 13 members in 4 generations. In the endemiological

distribution it was found that the infection is not easily transmitted to neighbours. There is no certainty about modes of transmission.

Streptomycin and oxytetracycline are at present considered to be the most active drugs against rhinoscleroma. Philip Manson-Bahr

CHAMBON, L. & FOURNIER, J. Constitution antigénique de *Malleomyces pseudo-mallei*. I.—Caractères morphologiques, culturels, biochimiques et variations de type immunologique. [**The Antigenic Constitution of *Malleomyces pseudo-mallei* (*Pfeifferella whitmori*). I. Morphological, Cultural and Biochemical Characters and Variations of Immunological Type**] *Ann. Inst. Pasteur*. 1956, Sept., v. 91, No. 3, 355–62, 1 fig.

Strains of *Pfeifferella whitmori* may possess varying amounts of a mucoid and an envelope antigen in addition to the O and R antigens, and a variety of forms other than the well-known smooth and rugose colonial types may arise. The mucoid (M) antigen is found specially in ageing cultures in sucrose-containing media incubated at 30°C. It is associated with bacterial lysis, the centre of the colonies consisting of lysed organisms and the translucent periphery of amorphous mucoid material. The envelope antigen (K) appears as a capsular substance on either S or R organisms and is not associated with impaired motility. Various sugars favour its appearance. On glucose-gelatin the K colonies are whitish and opaque in contrast to the blue-grey clear colonies of non-capsulated organisms. Colonies of intermediate types are described.

The various colonial types associated with possession of O, R, M and K antigens are described. For example on first isolation from pathological sources it is usual to obtain rugose colonies classified as RK, which are stable, active biochemically and show bipolar staining, or as O(R)K, which are unstable (producing many colonial variants), less active biochemically and stain uniformly. In old stock cultures the envelope tends to be lost and a smooth translucent colony form to be developed. Culture in anti-O serum produces very rough, adherent colonies of long, non-capsulated forms devoid of pathogenicity.

There appears to be an association between biochemical activity, virulence and the possession of K antigen, all of which may be lost on subculture. J. C. Cruickshank

CHAMBON, L. & FOURNIER, J. Constitution antigénique de *Malleomyces pseudo-mallei*. II. Démonstration de l'existence des antigènes M, K et O et étude de leurs propriétés immunologiques. [**Antigenic Constitution of *Pfeifferella whitmori*. II. Demonstration of M, K and O Antigens and Study of their Immunological Properties**] *Ann. Inst. Pasteur*. 1956, Oct., v. 91, No. 4, 472–85.

The English summary appended to the paper is as follows:—

“The study of the different culture types of *Malleomyces pseudomallei*

suggests the existence of three antigens: a mucoid antigen M, a capsular antigen K and a somatic antigen O.

"The authors have demonstrated their existence by serological tests based upon their difference in sensitivity to the action of formol, ethyl alcohol, heat and normal hydrochloric acid and upon inagglutinabilities caused by these antigens.

"The properties of the M antigen of Whitmore's bacillus are similar to those of the M antigen of the *Enterobacteriaceae*. This antigen produces an agglutination which may be partially dissociated in tubes and appears rapidly on slides. It causes K and O-inagglutinability.

"Antigen K behaves like a capsular antigen. It gives a 'crape type' agglutination on centrifugation, total and immediate on slides. It determines an O-inagglutinability or hypo-agglutinability variable according to the extent of the dissociation $OK \rightarrow OKm \rightarrow O$, which can be total with a bacterial suspension treated with 50% alcohol.

"The somatic antigen O is comparable to that of the Gram-negatives. It gives granular agglutination by centrifugation, tardy on slides."

GOYAL, R. K. & SARIN, J. C. **Pattern of Liver Diseases in Rajasthan. (An Analysis of Histopathological Examinations of 401 Livers from Biopsy and Autopsy Cases.)** *J. Indian Med. Ass.* 1956, July 1, v. 27, No. 1, 1-5. [14 refs.]

This paper is based on the examination of 331 biopsy and 76 autopsy specimens of liver. Focal necrosis was the commonest lesion present in 135 specimens, which included a wide variety of infections, but most frequently in pulmonary tuberculosis. A high incidence (17 out of 25 biopsies) was found in anaemia. There were 40 specimens of cirrhosis, of which 21 were judged to be post-necrotic: of the remaining 19 cirrhotic livers, 11 showed fatty infiltration. A discussion attempts to relate the findings to possible dietary and other factors which may be responsible for the focal necrosis or the cirrhosis. No definite conclusions are drawn, but the paper points out well the importance of liver disease in Rajasthan and the difficulties of elucidating the role of the many possible aetiological agents.

R. Passmore

BANERJI, D. **Treatment of Tropical Eosinophilia by Inhalation of an Aerosol of Diethylamine Acetarsol.** *J. Indian Med. Ass.* 1955, Nov. 1, v. 25, No. 11, 431-5.

The aerosol, 3 ml. of diethylamine acetarsol (23.6 per cent. = 150 mgm. As) sprayed from a Vilbiss atomizer, was administered daily to 10 patients suffering from tropical eosinophilia. The patients all had chest symptoms, cough and wheezing and a high absolute eosinophil count, 1,700 to 14,000 per cmm. "Radiological examination was not considered essential for diagnosis."

The spray was used at one session daily or on alternate days; in

6 cases the solution was diluted by 30 ml. of water but in 4 it was given undiluted. The nozzle of the atomizer was introduced into the mouth and each time the spray was emitted the patient took a deep breath.

In a few patients symptoms were increased after the first treatment and in these the following dose was decreased slightly. "Symptomatic relief was felt after 4 to 8 days of the therapy. This effect was noticed even in those cases where rhonchi persisted in the lungs or where the eosinophilic count was not lowered."

Of the 10 patients treated, "9 showed complete remission of symptoms, but the eosinophil count was satisfactorily lowered in 4 cases only".

The author concludes that the best course is daily inhalations for 8 to 10 days of 3 ml. of solution undiluted, but that, since his results indicate little advantage of the inhalative treatment over parenteral injection, tropical eosinophilia must be considered a systemic rather than a purely respiratory disease.

L. E. Napier

PARASITOLOGY: GENERAL

AMERICAN SOCIETY OF PARASITOLOGISTS. **Program and Abstracts of the Thirty-First Annual Meeting, Storrs, Connecticut, August 26, 27, 28, 29, 1956.** *J. Parasitology*. 1956, Aug., v. 42, No. 4, Sect. 2 (Suppl.), 47 pp.

This programme contained 103 papers and the usual abstracts of them are provided. Those subjects of special interest to readers of this *Bulletin* included the following (the number of papers are in brackets).

Schistosomes and their vectors (8), *Hymenolepis* (7), trypanosomes (5), *Ascaris* (5), *Trichinella* (3), *Trichuris*, *Echinococcus*, *Plasmodium* (2 each), amoebae, leishmaniae, *Taenia*, *Strongyloides* (1 each).

The Presidential Address, by Eloise B. Cram, of the National Institutes of Health, Bethesda, was entitled "Stepping Stones in the History of A.S.P."

H. J. O'D. Burke-Gaffney

TEUSCHER, E. & STÜNZI, H. Über parasitologische Kotuntersuchungen bei Säugetieren des Zoologischen Gartens Zürich. [**Parasitological Study of the Faeces of Mammals in the Zürich Zoological Gardens**] [Miscellanea.] *Acta Tropica*. Basle. 1956, v. 13, No. 3, 262-9.

PESSÔA, S. B., DA SILVA, L. H. P. & COSTA, L. Nota sobre a incidência de parasitoses intestinais em zonas urbana e rural do Estado da Paraíba. [**Incidence of Intestinal Parasites in Urban and Rural Zones in Paraíba State, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1955, Oct., v. 7, No. 4, 423-7. English summary.

The authors examined the stools of 1,389 and 496 persons respectively in an urban and a rural area of Paraíba State, Brazil. The results are

shown in 18 tables, which set out in great detail the age, sex and racial composition of the population and the parasites found in these groupings.

For details, the original tables should be examined, but the following percentage figures give some indication of the findings.

		Urban (João Pessoa City)	Rural (Santa Rita County)
<i>Schistosoma mansoni</i>		25.63	40.73
<i>Ascaris</i>		86.10	86.09
<i>Ankylostomes</i>		47.66	55.64
<i>Entamoeba histolytica</i>		28.57	28.19

It is concluded that both the district studies in João Pessoa City and the rural area in Santa Rita County are within a highly endemic zone both for intestinal helminths and protozoa. *H. J. O'D. Burke-Gaffney*

MATAJC, L., FETTICH, D., VANDOT, S., ČERMELJ, V., KRAMBERGER, V., BOŽIČ, C. & LIKAR, M. Endemija pnevmocistoz na pediatrični kliniki v Ljubljani. [**An Epidemic of Pneumocystosis in a Children's Clinic in Ljubljana**] *Zdravstveni Vestnik*. Ljubljana. 1956, v. 25, No. 5, 204-7. [20 refs.] English summary.

In 1953-54, 45 cases of interstitial pneumonia occurred in infants in the authors' hospital in Ljubljana. The patients included 2 sets of triplets and 6 sets of twins, and 39 were premature infants; 22 contracted the disease in hospital and 31 at home, and 19 cases (40 per cent.) were fatal. Other conditions associated with the infection were neonatal jaundice (6 cases) and intracranial haemorrhage (2 cases). Mild and fulminating forms of the disease were observed, with recurrences after an interval of 7-30 days.

The clinical picture was characterized by dyspnoea, and cyanosis persisting into convalescence, with asphyxial attacks requiring artificial respiration, dry cough, purulent rhinitis and the presence of viscid foam in the mouth. The chest was normal to percussion, and auscultation revealed little apart from crepitations. The temperature was usually normal, and pyrexia only occurred as a result of dehydration or intercurrent infection. Complications included catarrhal or suppurative otitis media (22 cases), bronchopneumonia (4 cases), strangulated inguinal hernia (2 cases), and fracture of ribs with prolapse of the rectum (1 case).

X-ray examination of the chest showed a ground-glass appearance in the upper lobes, with shadows of varying density, and emphysema of the lower lobes. The complement-fixation test with a lung antigen from a fatal case of pneumocystosis was positive in 3 of 7 instances, with titres up to 64; it was also positive in 3 of 5 premature infants dying of bronchopneumonia and in 2 of 15 nurses, and negative in 6 healthy premature infants in the same environment.

D. J. Bauer

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

GRENIER, P., ADAM, J. P. & HAMON, J. Une méthode rapide de montage des préparations microscopiques adaptée au travail entomologique en régions tropicales. (Méthode du baume à chaud, chloral-phénol.) [**A Rapid Method for Mounting Microscopic Preparations in Entomological Work in the Tropics: Hot Balsam with Chloral-Phenol**] *Bull. Soc. Path. Exot.* 1956, Mar.-Apr., v. 49, No. 2, 335-8.

The authors describe two modifications of a new method for making rapid permanent mounts of insect material under conditions of high humidity where conventional media, including polyvinyl alcohol, are inefficient.

The simpler of these modifications, both of which basically employ natural balsam, is suitable for the preservation of skeletal fragments, wings or other material usually not fixed. The portion required, or the whole insect, is dried for several days in a desiccator, and placed into a small drop of the balsam syrup on a slide blank. The slide is heated until the balsam begins to turn yellowish brown in colour, a warm coverslip is then applied, and the preparation allowed to cool.

For tissues or entire insects already cleared in Berlese's acetic-chloral [formula cited], a drop of balsam syrup is warmed on a slide for 2 minutes, and allowed to cool. A drop of Amann's chloral-phenol [formula cited] is placed in the centre of the balsam and the specimen, previously kept for 10 minutes in warm chloral-phenol, transferred to it. After this has been arranged as necessary, excess chloral-phenol is removed, the balsam is reliquified by placing the slide on a hot-plate (55°C.), and a coverslip added. The chloral-phenol procedure can be replaced by putting the insect material for 15 minutes in almost boiling alcohol (95 per cent.), followed by an hour in fuming hot beechwood creosote. *N. R. Phillips*

LEWIS, S. E. & SMALLMAN, B. N. **The Estimation of Acetylcholine in Insects.** *J. Physiology.* 1956, Oct. 29, v. 134, No. 1, 241-56, 3 figs. [22 refs.]

See also p. 9, SALITERNIK, **Mosquito Control in Israel.**

KETTLE, D. S., NASH, Ruth H. & HOPKINS, Barbara A. **Field Tests with Larvicides against *Culicoides impunctatus* Goetgh. in Scotland.** *Bull. Entom. Res.* 1956, Oct., v. 47, Pt. 3, 553-73, 4 figs. [11 refs.]

"Field tests were conducted on Soutra Hill (1,100 ft. above M.S.L.) in the winters of 1953-4 and 1954-5 to find a suitable larvicide for controlling

Culicoides impunctatus Goetgh. In one trial, four formulations (wetable powder, water-miscible concentrate, oil solution and dust) of DDT and γ BHC were applied to plots (10 $\times$ 10 yd.) at dosages of 3, 12, 50 and 200 mg. p,p'DDT or γ BHC/sq. ft., except for the γ BHC dust which was applied at 3, 6, 12 and 25 mg. γ BHC/sq. ft. In a second trial, the larvicidal properties of aldrin, dieldrin and malathion wettable powders, chlordane water-miscible concentrate and malathion emulsifiable liquid were investigated at three or four of the following dosages—3, 6, 12, 25 and 50 mg./sq. ft. The conclusions to be drawn from these trials were:—

- “ 1. DDT was superior to γ BHC at all dosages and in all formulations both in immediate and residual effects.
- “ 2. For immediate larval control, DDT and γ BHC wettable powders and DDT water-miscible concentrate were effective but γ BHC water-miscible concentrate was relatively ineffective.
- “ 3. Although all the DDT preparations were effective as residual larvicides, the wettable powder was the most successful.
- “ 4. For immediate larval control a dosage of 200 mg. p,p'DDT or γ BHC is required. The effect produced by 50 mg./sq. ft. is variable.
- “ 5. For residual larvicidal action a dosage of 50 mg./sq. ft. is required although 12 mg./sq. ft. may sometimes be effective.
- “ 6. Both preparations of malathion reduced the initial larval density by just over half but they had no residual effect.
- “ 7. Chlordane and aldrin achieved an immediate larval reduction of one third but whereas chlordane had a greater residual effect, aldrin was ineffective.
- “ 8. Dieldrin had very little immediate (20 per cent. control) but considerable residual effect (72 per cent. control).
- “ 9. Wettable powders are the most successful larvicidal preparations.
- “ 10. DDT and γ BHC wettable powders at 50 mg. p,p'DDT or γ BHC/sq. ft. are superior to chlordane at the same dosage and slightly better than dieldrin at 25 mg./sq. ft.”

See also p. 75, LEWIS, **Notes on Simuliidae in the Sudan.**

BROWN, A. W. A. **DDT-Dehydrochlorinase Activity in Resistant House-flies and Mosquitos.** *Bull. World Health Organization*. Geneva. 1956, v. 14, No. 4, 807–12.

Following the characterization of DDT-dehydrochlorinase in resistant house-flies with spectrophotometric methods, an attempt has been made to extend these studies to 2 DDT-resistant mosquitoes.

The resistant mosquitoes used were larvae of salt-marsh mosquitoes (*Aedes taeniorhynchus* admixed with *A. sollicitans*) from Florida and a
(2225)

Trinidad strain of *Aedes aegypti*. The salt-marsh mosquitoes were found to be 13 times more resistant, and the Trinidad *A. aegypti* 500 times, than their respective susceptible strains. For comparison 2 strains of *Musca domestica* were investigated, one resistant to DDT and the other to Dilan.

Homogenates and acetone powders were made of the insect material. The products of the enzyme reaction were extracted in cyclohexane and assayed in the Beckman DU spectrophotometer with the U-V attachment. The results showed that in the house-flies DDE production by the homogenates was considerable. The dehydrochlorinase activity of the Dilan strain approached that of the DDT strain.

Larvae of each strain of mosquito were exposed to DDT suspension for 24 hours and their DDT uptake and DDE production determined by the Schechter-Haller method. It was observed that both normal strains produced an insignificant amount of DDE, their DDT uptake being small. The resistant strains exposed to higher dosages accumulated much DDT and also produced considerable amounts of DDE, the ratio of DDE to DDT being 22 per cent. for the salt-marsh mosquitoes and 10 per cent. for *A. aegypti*. It is significant that weight for weight the resistant *A. aegypti* larva and the DDT resistant house-fly produced equal amounts of DDE.

When DDT-dehydrochlorinase activity was assessed by means of acetone powders and homogenates, incubated with DDT in ethanol or on glass beads at various concentrations, there was no significant production of DDE. The author is of the opinion that the DDT-dehydrochlorinase activity in these mosquitoes requires different conditions from those suitable for the house-fly. [See also this *Bulletin*, 1956, v. 53, 1492.]

W. Z. Coker

KILPATRICK, J. W. & SCHOOF, H. F. **Fly Production in Treated and Untreated Privies.** *Pub. Health Rep.* Wash. 1956, Aug., v. 71, No. 8, 787-96, 9 figs.

Human excrement forms an important breeding ground for numerous species of flies, but the house-fly *Musca domestica* breeds to only a small extent in this medium. In 1951, however, it was noticed that human faeces were becoming increasingly important for house-fly breeding. Studies in the Lower Rio Grande Valley, Texas [this *Bulletin*, 1956, v. 53, 1284], and in Phoenix, Arizona [*ibid.*, 1955, v. 52, 221], and Charleston, West Virginia, indicated that this intensive house-fly breeding was associated with the use of dieldrin as a residual or larvicidal treatment in privies.

This paradox was investigated in south-eastern Georgia, near Savannah. In 1953 fly emergence from selected privies was studied and in 1954 certain chlorinated hydrocarbon insecticides were used in various ways to assess their effect on house-fly and other fly production in those privies. Privies treated with DDT yielded no more house-flies than untreated

privies. However, those treated with dieldrin, BHC, chlordane and aldrin produced increased house-fly breeding.

Pre-treatment and post-treatment levels of dieldrin resistance in house-fly populations were measured by exposing progeny of wild-caught females for 30 minutes to plywood panels treated with dieldrin at the rate of 25 mgm./sq. ft. Mortality counts were made 48 hours later. In November 1953 mortality was over 60 per cent.; in August 1954 it was reduced to about 1 per cent.

In view of these findings the use of these chlorinated hydrocarbon insecticides in privies should be avoided.

W. Z. Coker

KANO, R. & OKAZAKI, T. **Notes on the Flies of Medical Importance in Japan. Part X. Descriptions of Four New Species and One Newly Found Species of *Sarcophaga* from Tokyo.** *Bull. Tokyo Med. & Dental Univ.* 1956, July, v. 3, No. 1, 73-80, 7 figs. & 2 pls.

LOOMIS, R. B. **The Chigger Mites of Kansas (Acarina, Trombiculidae).** *Univ. Kansas Sci. Bull.* 1956, June 29, v. 37, Pt. 2, 1195-1443, 49 figs. & 29 maps. [Numerous refs.]

KAMO, H. **Records of Trombiculid Mites from Aves in Kyushu.** *Kyushu J. Med. Sci.* Fukuoka. 1956, Apr., v. 7, No. 1, 29-35. [25 refs.]

RAO, T. R. & HALGERI, A. V. **A Note on Resistance of Bed Bugs to D.D.T. in Bombay State.** *Indian J. Malariology.* 1956, June, v. 10, No. 2, 149-54.

In several parts of Bombay State DDT residual spraying has been carried out for some years against malaria. At the beginning of the scheme the inhabitants felt a great relief from the bites of bed bugs (*Cimex hemipterus*). Shortly afterwards the bugs were found to be unaffected by the dosages employed. It appears that the situation is worst in the humid and warm districts situated below the Western Ghats, particularly the whole of Kolaba District and Savantwadi Taluka in Ratnagiri District.

In this note the authors report on experiments that have been done in Poona City to test the possible development of resistance to DDT. Information on the natural susceptibility of bed bugs before wide-scale use of DDT commenced is not available; however, in 1952 dosage/mortality tests were made in Poona City at a time when the ineffectiveness of DDT on bed bugs was being noticed. In 1955 similar tests were made.

Talcum powders containing 1, 2 and 5 per cent. DDT (Technical) were

prepared. Filter papers were thinly covered with these powders and 10 fully developed wild-caught bugs were placed on each in a Petri dish for 2, 4, 6, 8 or 10 minutes. Mortality counts were made 24 hours later.

The results showed that whereas in 1952, 50 per cent. mortality could be obtained with 2 minutes' exposure to 5 per cent. or 4 minutes' exposure to 2 per cent., in 1955 there was no kill even at 5 per cent. for 10 minutes. It is interesting that when the dosage was then increased to 75 per cent. and exposure time to 30 minutes there was only 45 per cent. mortality. It would appear that a high degree of resistance to DDT has occurred in bed bugs between 1952 and 1955 in Poona City. *W. Z. Coker*

WRIGHT, R. H. **Physical Basis of Insect Repellency.** [Correspondence.] *Nature*. 1956, Sept. 22, v. 178, 638, 1 fig.

The fact that substances of very different chemical structure and type can have similar physiological properties has long been puzzling. Physical explanations in connexion with absorption of energy at certain levels (corresponding to molecular vibrations) have been sought in the Raman shifts characteristic of certain odours (MOCRIEF, R. W., *The Chemical Senses*, 1951, London). Infra-red absorption bands of various insect repellents have also been examined; but KASMAN *et al.* [this *Bulletin*, 1953, v. 50, 1168] found no correspondence.

However, the author of this letter claims to have been more successful. He examined the infra-red absorption spectra of 20 repellent and 20 non-repellent chemicals. He states that of the repellents, 13 had an absorption peak between 449 and 471 cm^{-1} and 3 of the remainder showed continuous absorption in this area; in contrast, only one of the non-repellents had a peak in this region. The author illustrates this discovery with figures showing absorption curves of 5 common repellents agreeing with his hypothesis, and one exception. [The curves do not help to convince the abstracter; but perhaps they are reproduced on too small a scale.]

J. R. Busvine

MISCELLANEOUS PAPERS

MANSON-BAHR, P. **Sir Patrick Manson. The Founder of the Medical College of Hong Kong (October 1st, 1887), and its First Dean.** *Elixir*. Hong Kong. 1956, 22-30, 5 figs.

The life and work of Sir Patrick Manson need no introduction to readers of this *Bulletin* and for them also Sir Philip's devoted biographical studies need no bush. The present paper—which forms the substance of a lecture given to the Hong Kong University Medical Society in October 1955—

covers familiar ground: but its peculiar emphasis lies in the account of Manson's foundation of the Medical College of Honk Kong. Manson lived for 23 years in South China. In 1886 he founded the Medical Society of Hong Kong, and later, deploring the lack of medical facilities and education, he collected his friends together and suggested the formation of a school of medicine for Chinese students. The College was founded in October 1887. Manson was its first Dean and Cantlie its second: and it is interesting to recall that "the first and best pupil" was Sun Yat-Sen who was 9 years later in London to be associated so dramatically with his two former teachers.

The paper sets out with characteristic verve and zest the story of Manson's accomplishments, and the many intimate personal minutiae serve to bring him and those around him vividly to mind. Once again readers will have reason to be grateful for the *pictas* which has stimulated the author in keeping Manson's memory green.

H. J. O'D. Burke-Gaffney

REPORTS AND SURVEYS

MEDICAL RES. COUNCIL OF NEW ZEALAND. **New Zealand Medical Research in the South West Pacific. A Report of the Work of Research Expeditions sent to Western Samoa, Rarotonga and Pukapuka during the Period 1948 to 1953** [McCarthy, D. D. (collated and edited by)]. 116 pp., 3 graphs. [Numerous refs.]

This is a report from the Medical Research Council of New Zealand which gives detailed information about the disease patterns as they exist among the indigenous peoples of New Zealand's island territories. A series of expeditions, staffed by research workers from the University of Otago and associated research organizations, were sent to carry out preliminary surveys. The first set out for Western Samoa in the summer of 1948-49, followed in 1949-50 by a second to Rarotonga in the Cook group. During this period Dr. Muriel Bell spent 2 weeks in Samoa making a reconnaissance into the state of nutrition, with special reference to the adequacy of protein intake and the presence of anaemia. In 1950 one expedition went to the island of Manono in the Samoan group where extensive studies of yaws and other skin infections were carried out, and another to Pukapuka, an atoll in the North Cook group. The latest expedition, in 1953, was again to Western Samoa to study the bacteriology and aetiology of skin infections, and filariasis.

Details valuable in themselves, but hardly suitable for abstraction, are given of these islands. The total population of Western Samoa on December 31, 1950, was estimated at 81,090, comprising 74,663 Samoans,

5,866 of part Samoan blood possessing European status and 327 full Europeans mainly from New Zealand. The territory consists of 4 islands with a total area of about 1,200 square miles, Savaii, Upolo, Manono and Apolima. The Cook Islands are a group of 15 islands, which are small and scattered through an area of some 850,000 square miles, the total land area being approximately 100 square miles. Niue, or Savage Island, lies 580 miles west of Rarotonga, and has been under independent administration since 1903. It measures approximately 100 square miles with a population of about 4,500. The Tokelau Islands consist of atolls, 3 of which are New Zealand dependencies, and of which the southernmost is American. They have the distinction of having been first discovered by the Spanish navigator, Quiros, in 1606.

For the statistician there are tables of vital statistics for the islands enumerated. The birth and death rates per 1,000 of population vary considerably, as follows:—

							<i>Birth rate</i>	<i>Death rate</i>
Samoa	...	...	...	...	...	...	41.3	6.4
Cook Island	...	...	...	...	...	...	38.7	19.1
Niue	...	...	...	...	...	...	45.4	17.1
Tokelau	...	...	...	...	...	...	34.4	6.4
Pukapuka (an atoll of the N. Cook Group)	...	...	...	...	...	...	31.8	27.7

In the last-named island 34 per cent. of infant deaths occur within the first week of life and 49 per cent. within the first month. It is stated that 43.7 per cent. of deaths during the first week are due to "bleeding navel" and 20 per cent. to prematurity. The former appears to be due to vitamin K deficiency.

Housing and sanitation conform much to the same pattern throughout the area, as do food, diet and nutrition. The figures suggest that the Samoan children during the earlier years are lighter than those of corresponding age in New Zealand—both European and Maori; and this lag in weight appears to continue in the case of village inhabitants. Rarotongan children are approximately the same build, height and weight as New Zealand children, smaller than New Zealand Maoris, but bigger in most respects than the other groups.

A brief nutritional survey was carried out in 1950 in the island of Opolu. Altogether 260 haemoglobin and serum protein estimations were made. It was noted that infants in the post-weaning period appeared to lose condition and then become susceptible to intercurrent infections. This is reflected in the high death rate for this age-group. It stands at 5.2 for 1 week to 1 month; 26.5 for 6–12 months; and 28.1 for 1–2 years. The death rate under 12 months but over 1 month is at least 41 per 1,000 births compared with a corresponding figure for New Zealand Europeans during the same years of 7.5. Weanlings and toddlers are at a disadvantage by absence of sufficient animal protein, especially milk. In general, anaemia is not widespread and when it occurs is generally only of medium degree. The figures for pregnant women would seem to warrant the

conclusion that Samoan women of child-bearing age could have better average haemoglobin values if iron intake could be increased during pregnancy.

Except for a relative deficiency in vitamin C and a marked deficiency in vitamin A, the very restricted diet of the Pukapukan supplies the main nutritional requirements. Analysis of the pandanus fruit shows that this element does not make up vitamin A deficiency. Fat ingestion in the form of coconut oil is in excess of the usually accepted requirements of the body. Much of this fat is not utilized, being passed directly in the faeces.

Filariasis

Filariasis is undoubtedly the chief scourge of these Pacific islands and it is hardly necessary to emphasize that several extensive surveys have been carried out on this disease since the publication of O'CONNOR's report in 1923. In Western Samoa the chief area studied was the village of Sauli in the vicinity of Apia. With the standard quantity of 20 cmm. blood, 955 films were examined of which 23·7 per cent. were positive—a figure which agrees more or less with those of other Pacific islands, while the graphs and tables show results which closely approximate to the generally accepted picture. The average microfilaraemia and the filarial infection rates reach their acme at the 4th–5th decade and are then followed by a decline, and the preponderance of males affected over females follows the general rule. Difficulties were encountered regarding which manifestations should be regarded as necessarily filarial. It is possible, for instance, that the recorded incidence of filarial glandular enlargement may be lower than the true rate. The earliest age at which this sign was recorded was 3 years and the earliest age at which microfilariae appeared in the blood was 7. The long delay between the first appearance of physical signs and the detection of microfilariae in the blood can be accounted for by the time these would require to complete their development in the human host. The incidence of microfilariae in the peripheral blood follows that of the physical signs, but at a lower level. The incidence of infection in the population, judged by all available signs, mounts steadily as age increases from 2·6 in children up to the age of 4 to 68·6 in adults over the age of 56. No adult filariae were obtained.

A novel piece of information is to the effect that the microfilariae of Samoa do not always conform to the classical microfilariae of *W. bancrofti*. However, when these minor discrepancies are gone into, none of them appears to be of decisive importance.

In Rarotonga a survey in 1949 of 120 children showed that 27·5 per cent. had microfilariae. In the island of Pukapuka the youngest with microfilariae was aged 2. [The youngest recorded by O'CONNOR from the Ellice Islands was in a boy of 4 (see *Researches in the Western Pacific*, 1923, p. 30; this *Bulletin*, 1923, v. 20, 891); but JORDAN (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1952, v. 46, 207) has reported microfilariae of *W. bancrofti* in 2 African children, less than 1 year old, in Tanganyika.]

A noteworthy feature was the high rate of infection among children up to the age of 5 and the fall in percentage incidence of microfilariae during the following decade. As elsewhere elephantiasis is a relatively late manifestation so that approximately 6 per cent. of the population over the age of 15 had it. The earliest age was 16 in males and 26 in females.

Yaws

Although the situation in Samoa is very similar to that in Jamaica, in many respects it is worse. Although the records included only active yaws, 23.1 per cent. of the children under 5 years and 39.8 per cent. of those from 5 to 9 years had yaws. Even in the earliest age-groups 30 per cent. had lesions only on the soles of their feet; most had more than one lesion, suggesting that these children had already reached the secondary stage. Moreover, the occurrence of a sabre tibia in a child of 4 supports the view that this disease is acquired very early by the Samoan child. In spite of the great efforts which have been made to provide adequate treatment, yaws remains widespread.

An intensive survey was made on the island of Manono. This small volcanic island is one mile in diameter, contains 1,000 people grouped into 4 villages. Of these, 765 were subjected to clinical examination and 13 per cent. showed infective granulomatous lesions; 23 per cent. of children in the first decade and 17 per cent. in their second had them. The survey indicated the extent to which cases change from the infective to the non-infective state and *vice versa*. In spite of massive treatment the general incidence remains high, which supports the view that in endemic areas mass treatment of yaws has little effect unless non-infective as well as infective patients are treated at the same time. Juxta-articular nodes were seen in 4 patients, enlarged bursae in one and dorsal ganglia in 3. For some reason, as yet unknown, yaws is not a common disease in Rarotonga.

Other Skin Diseases

Other skin diseases seen in Western Samoa included prickly heat only seen in young children, scabies most common in babies, and impetigo in children of one to two years. Tinea versicolor, locally known as *tane*, is very prevalent and shows a gradual increase with age. From other ringworms the following Trichophytons were isolated:—*T. mentagrophytes*, *T. rubrum*, *T. sulphurum*, *T. concentricum*.

Diphtheria

Of the 23 strains of *C. diphtheriae* recovered from lesions, 4 gave positive virulence tests in guineapigs. It seemed probable that residence in the skin of *C. diphtheriae* leads to loss of virulence. Faucial diphtheria was not seen.

Skin infections in Rarotonga were common, but never as widespread as reported from Samoa.

Tuberculosis

In Western Samoa records were available of 167 cases of pulmonary tuberculosis and X-ray films were available for 66. Apical infiltration, isolated sub-apical foci and apicocaudal spread, the common picture in Europeans, is quite uncommon. Tuberculin positive rates are high and many infants less than one year gave a positive reaction.

Intestinal helminthiasis

In Western Samoa in a series of 83 boys at school 18.1 per cent. had ankylostomes, 20.5 per cent. *Ascaris* and 24.1 per cent. *Trichuris*. In Rarotonga the percentages were higher.

Intestinal protozoal infections

Intestinal protozoal infections were investigated in Western Samoa. *Entamoeba coli* was found in 11.9 per cent. *E. histolytica* was present only in adults and in the low percentage of 4.2.

This exhaustive survey closes with sections on conditions of the teeth, mouth and pharynx, the tonsils and eye conditions. Haematology has a section to itself. On the whole, in spite of helminthic infections, haemoglobin values in Rarotonga are high. There is some variation with age, the readings tending to be lower in the younger age-groups. The most striking feature in the blood of Samoans is the high values for serum proteins, a finding which is rather different from what might have been expected considering the low protein intake. In differential blood films from 326 persons in Rarotonga the most notable abnormality was the high degree of eosinophilia, the average being 13.5 ± 0.35 per cent. with a standard deviation of 6.25 and a range of 0.25 per cent. in most cases. There appeared to be a significant variation with age. There seemed to be no correlation of eosinophilia with filariasis, hookworm, sedimentation rate or plasma protein. In those under 16 there was a correlation of statistical significance between Wassermann reactions and eosinophilia. Those with positive or anti-complementary reactions had a higher eosinophilia (18.8 per cent. and 18 per cent., respectively), than those with negative reactions (12.8 per cent.).

Under the section on Entomology we find that in Western Samoa *Musca domestica* was the dominant fly in houses and *M. sorbens* the dominant species in the open. Motile spirochaetes were recovered from the crop of *M. sorbens* up to 2 hours after a fly had fed on a yaws lesion, and of 44 examined 32 (73 per cent.) were positive. The organisms were *Treponema pertenue*.

An experiment in the control of *Aedes polynesiensis* by residual spraying of houses was begun in Rarotonga in 1950 to determine the degree of control of filariasis which could be attained with DDT. The results appear rather inconclusive as might have been expected where this species of vector is concerned. All evidence the Commission was able to collect reinforced the generally held opinions regarding its feeding and breeding

habits. Information was obtained concerning the proportion of infected mosquitoes caught in houses compared with those taken in plantations. When the difference in infectivity rates is considered with the density of mosquito infestation it appears that there are actually 2.4 times as many infected mosquitoes in houses as there are in plantations. It became apparent that the infectivity rate is in a state of constant fluctuation, falling after emergence and rising again as young mosquitoes acquire infections. The percentage infected varied at different dates from 1.8 to 13 per cent. Collections from untreated houses were as high as 22 per cent. A comparison was made between data obtained from pre- and post-spray treated houses. In one case the percentage of infection was 6.8 before this treatment and 11.4 in the post-spray period.

[Attempts to arrive at definite conclusions from the dissection of wild-caught mosquitoes taken at random has recently given rise to criticisms especially in Malaya, where, on account of the great number of non-human filariae of birds and animals which utilize the same mosquito hosts, this method has been abandoned. The recent figures published in Fiji by SYMES (this *Bulletin*, 1955, v. 52, 1006) are subject to the same explanation.]

This summary indicates some points of special interest. For detailed findings in individual islands, the original should be consulted.

Philip Manson-Bahr

WADDY, B. B. **Organization and Work of the Gold Coast Medical Field**

Units. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, July, v. 50, No. 4, 313-36, 5 maps & 1 diagram. [16 refs.] Discussion 537-43 [DUGGAN, A.; ZAHRA, A.; CHESTERMAN, C. C.; CRISP, G.; MACDONALD, G.; KERSHAW, W. E.; McROBERT, G.; WADDY, B. B. (in reply)].

The welfare of people in much of the Gold Coast and neighbouring African territories turns on a vital period of 6 weeks annually, during which time alone the land can be tilled but when the incidence of disease is at its highest and food supplies are at their lowest. Even slight exaggerations of the difficulties may cause eventual famine, while amelioration may result in better harvests and a consequent progressive improvement in health and nutrition. To achieve such a result with the limited resources available the attack must be made first on those conditions which cause farming inefficiency, above all yaws, guineaworm and onchocerciasis, and effort should not be dissipated on too many or possibly unattainable objectives until substantial progress towards the primary objectives has been made.

With this philosophy Dr. Waddy took over the trypanosomiasis campaign of the Gold Coast and converted it into the system of Medical Field Units here described. The Units work under a central organization associated with clinical units largely concerned with training and with the

maintenance of field teams. A Unit has a Field Assistant as a leader and includes one or two other field assistants and 10 to 15 technicians trained in a limited number of diagnostic, microscopic and therapeutic routines. The Unit is mobile moving from village to village examining virtually all the inhabitants for the selected group of diseases, applying immediate treatment and where necessary leaving behind a group to undertake further treatment. Experience has been gained in this form of attack against trypanosomiasis, yaws, malaria, yellow fever, onchocerciasis, leprosy, schistosomiasis and epidemic diseases, particularly cerebrospinal meningitis. In the case of trypanosomiasis the mechanism, now long established, has proved to be of great value and details of the reduction of the disease are given. A more recent experience has shown the great value of this form of control of yaws, with the use of a single injection of penicillin in aluminium monostearate. Mass treatment of onchocerciasis has been practised since 1952 with Suramin, 0.02 gm./kgm. repeated 5 times at weekly intervals, causing a marked amelioration of skin conditions and, in some cases, a restoration of sight. The Unit has been effective in the survey of leprosy and in the reference of patients to fixed treatment centres, the control of the disease requiring a combination of the mobile and the static systems. The control of guineaworm has largely been by the application of DDT to water holes which has been followed by a remarkable diminution in the frequency of infection. The efforts to undertake surveys of malaria by this mechanism have not been hopeful and a yellow fever vaccination campaign in which scratch vaccine was used had to be abandoned.

The future of such Units is surveyed. They are considered the most effective and perhaps the only effective mechanism of introduction of medical services to new territories, but they should be linked with static units which might gradually grow at their expense. In the discussion of this paper, Duggan, Zahra and Chesterman made comparisons with the comparable systems in Nigeria and the Belgian Congo. Crisp commented on the possibility of controlling *Simulium*, Macdonald on the high technical standards achieved. Kershaw doubted the validity of conclusions on amelioration of onchocerciasis which could be drawn by such a mechanism and suggested that control of the disease would not require eradication of the vector but a reduction in its density. McRobert commended the principle for application in other territories.

G. Macdonald

BOOK REVIEWS

TOLENTINO, Paolo & BUCALOSSI, Antonio. **La toxoplasmosi.** 285 pp., illustrated. 1954. Rome: Il Pensiero Scientifico, Via Salaria 237. [L.2,500.]

In an introductory chapter the authors give an interesting account of the history of work on toxoplasmosis, aptly beginning with a quotation from Splendore's original description of the parasite.

They then proceed to consider its morphology and biology, and in so doing, relate virulence to rate of multiplication. The different susceptibilities of various animal species are considered. A discussion on immunity follows. They accept that cytoplasm-modifying antibodies detected in the dye test are lethal to the parasite but cannot reach it when it is intracellular and further suggest that soluble antigens released from the parasite may have a blocking effect. There is a useful discussion on the systematic position of toxoplasma and its resemblances to and differences from similar protozoa. After consideration of the signs and symptoms of toxoplasmosis and classification of the disease put forward by others they give one according to stages of infection:—

1. Acute: Following an infection toxoplasms multiply in all the host's tissues. This stage may be asymptomatic, mild, severe, or fatal. Visceral manifestations are glandular, enterocolic, hepatic, typhoidal, myocardial, pulmonary and pseudo-rickettsial. Neurological manifestations are chorioretinitis, meningitis, meningo-encephalitis.

2. Subacute: Toxoplasms, destroyed elsewhere by the host's defences, persist in nervous tissue and in the retina, giving rise to chorioretinitis and meningo-encephalitis. Death is less common than in the previous stage.

3. Chronic: Pseudocysts are present in nervous tissue, the retina, the myocardium and involuntary muscle. The patient is apparently well, but it is possible for pseudocysts to rupture and an allergic inflammation result. The seriousness of this will depend on its site.

This classification is applicable to both congenital and acquired infections.

The authors give illustrative cases taken from the writings of others and from their own experience. The various manifestations of toxoplasmosis affecting the eye are considered in detail. There follows a good exposition of the pathological anatomy of toxoplasmosis. Next comes differential diagnosis, which, the authors agree with Wiedemann, may be "devilish difficult". This leads to laboratory tests. The dangers of identifying the parasite on morphological grounds alone are pointed out and it is stressed that attempts should be made to isolate it by mouse inoculation. Good descriptions are given of the various antigen-antibody tests and their interpretation is discussed. There is a chapter on prognosis and therapy and finally one on epidemiology. While not denying other possibilities the authors favour the view that infection is most likely to take place

through the mucous membranes of the nose, pharynx or conjunctiva. In addition to the usually accepted transplacental transmission they suggest congenital infection during passage through the birth canal.

The authors have succeeded in bringing together in an attractive manner and enriching from their own thought and experience most of the present knowledge of toxoplasmosis. This is a useful book, well set out, well produced and well illustrated.

C. P. Beattie

PATERSON, Donald [M.D., F.R.C.P.]. **Sick Children. Diagnosis and Treatment.** 7th Edition. Revised by Reginald LIGHTWOOD, M.D., F.R.C.P., D.P.H., with the assistance of F. S. W. BRIMBLECOMBE, M.D., M.R.C.P., D.C.H. pp. x + 593, numerous illustrations. 1956. London: Cassell & Co., Ltd., 37/38, St. Andrew's Hill, E.C.4. [42s.]

When *Sick Children* was first published 26 years ago the author had in mind the needs of the general practitioner, as the four standard books on paediatrics were designed more for the medical student or budding specialist in children's diseases. The plan of the book and its simple approach to the common problems of the nursery also had an appeal to the intelligent mother or college-trained "nanny". This no doubt accounted for the display of a copy, with the sister volume on *Infant Feeding*, on the shelves of the Times Book Club in the section devoted to popular medical subjects, an honour not extended to other similar works at that time. Its popularity continued and demanded repeated new editions until the author's departure from Britain.

After an interval of nine years we certainly welcome the reappearance of an old friend. Dr. Lightwood and his colleagues are to be congratulated on having brought the subject-matter very much up to date. In doing so they have somewhat enlarged the scope of the work. There are few aspects of paediatrics which are not mentioned; rare diseases take their place alongside common disorders, and an answer will be found to most questions in regard to diagnosis and treatment.

In order to confine its size to reasonable proportions the book is bound to have rather a synoptic character and the reader's appetite is constantly whetted for further information. This is supplied to a certain degree by a number of well-chosen references, which might with some advantage have been augmented. Perhaps in the future Dr. Lightwood, in the light of his prolonged experience which can be read between the lines in this volume, will give us another, in which he can devote himself at greater length to some of the diseases which are touched upon rather lightly here.

The various chapters are well balanced and, with modern air travel having brought the East more closely in contact with the West, a most useful addition is the one by Dr. Cicely WILLIAMS on diseases of children in the tropics. The wisdom of administering quinine intramuscularly

instead of intravenously for malaria, which is unfortunately still largely the practice in the tropics, is surely open to criticism. Apart from this one point, this is an excellent account and obviously the result of rich experience she has gained from her devoted work over many years.

Mental defect is dealt with in masterly fashion by Dr. J. P. M. TIZARD, who also contributes a thoughtful chapter on disorders of the nervous system.

Excellent illustrations are to be found and the index directs the reader easily to the subject he requires. Useful tables on blood chemistry are accessible at the beginning and end of the book, and appendices are included on antibiotics and dosages of other drugs, vitamins, electrolytes and ossification data. In the light of possible adverse effects in premature infants the amount of vitamin K advocated should be reduced from the dose of 5-10 mgm.

Revision of a textbook is often more difficult than beginning one afresh, and Dr. Lightwood with the help of Dr. Brimblecombe must have laboured long in rewriting and recasting the work. They should feel pleased with the result, as there are few medical volumes at such a comparatively low price that contain so much useful information. *Bernard Schlesinger*

FIELD, John W. & SHUTE, P. G. **The Microscopic Diagnosis of Human Malaria. II. A Morphological Study of the Erythrocytic Parasites.** *Studies from Inst. Med. Res. Federation of Malaya.* No. 24, pp. x + 251, 37 figs. & 59 pls. (24 coloured). 1956. Kuala Lumpur: Govt. Press.

Readers of Field's *Descriptive Atlas of Thick-Film Diagnosis* [see this *Bulletin*, 1950, v. 47, 307] have awaited with impatience the second volume, which deals with the microscopical diagnosis of malaria by the examination of thin films. The original author is now joined by P. G. Shute, whose experience with malaria parasites in general and *Plasmodium ovale* in particular is unrivalled, and this broadens the scope of the work which was originally intended principally for workers in Malaya. Most of the material is still drawn from Malayan sources, but the discussion ranges over the whole field of the subject.

The second volume begins with a short historical account of the discovery of the blood forms of the malaria parasites, first by Laveran, who observed, in the blood of a patient in Constantine, crescents undergoing exflagellation; next by Golgi in Padua, who described the asexual cycle of the different species; then by Marchiafava, who elucidated the development of the parasites in the internal organs and the related pathology in patients dead from malaria in the Roman campagna; and lastly by MacCallum, who revealed the nature of exflagellation and the beginning of the sexual cycle first in avian and later in human malaria in the U.S.A. The other important historical landmark was the discovery

of a differentiating blood stain by Romanowsky, which revealed the detailed morphology of the parasites.

The 4 species of human malaria parasites are described in separate chapters and later in a series of plates with accompanying texts. Each chapter contains introductory paragraphs describing the synonymy, hosts and geographical range of the parasite, then information regarding the incubation and prepatent periods including threshold densities, next a general description of the infection and finally a description of morphological variations of the species. Although numerous varieties or sub-species have been described, a minority only have received names and none of them have attained general recognition; the authors insist that acceptance of genuine sub-species is only possible if the infection is followed through the mosquito to new hosts, and its characters confirmed.

The blood forms of the 4 human species are described in great detail and are illustrated first in dilute India ink wash and later in some very fine 3-colour plates. These descriptions and illustrations probably represent today the most complete study of the malaria parasites of man as found in the blood. Particularly realistic are the reproductions of the stippling of the corpuscle caused by the different species, and which is so important in diagnosis. A special plate demonstrates the great importance of a correct pH for eliciting stippling.

The work is much more than an account of the morphology of the organism; factors influencing schizogony and gametogony are discussed from all angles and very useful information is given regarding the duration of these processes, relapses, density of parasitaemia and even its relation to prognosis, methods of cultivation and distribution of the parasite in the body. There is a useful summary of the significance of the "negative" blood film in cases of suspected malaria, with the practical conclusion that when in doubt, treat as malaria. There is a long account of the position of the parasite in relation to the erythrocyte, and the argument is continued in various parts of the book, the authors being loath to accept the evidence of the electron microscope that the parasite really lies inside the corpuscle.

An interesting section is devoted to malaria pigment and 3 plates illustrate the size and distribution of the granules after removal of the other contents of the parasite; the differences in the 3 species and at various stages are thus made very apparent.

Later chapters describe methods of examination including blood, marrow, spleen, placenta, skin and organs post mortem; technical miscellanea including preparation of reagents, exflagellation studies, preservation of material, concentration of parasites and counting methods; the morphology of malaria parasites damaged by drugs (as an appendix).

There are 3 splendid colour plates, and 2 uncoloured, illustrating puzzles and fallacies in the examination of the blood. Every worker in the tropics will be familiar with the appearance of many of the objects shown, but will welcome the definitive identification, such as algae, devitrification of

the glass slide, fungal hyphae and spores. Another coloured plate shows abnormalities of the erythrocyte which sometimes cause difficulties in the interpretation of thin films.

All malariologists will find this volume, like the first, invaluable; it will undoubtedly prove of use also to laboratory workers throughout the tropics or in places where malaria still occurs, and for its complete description of one stage of the human species of the genus *Plasmodium* it will be necessary for the zoologist and parasitologist. *P. C. C. Garnham*

JAMES, Clifford S. [M.B., Ch.B., D.T.M. & H., F.R.C.S., F.R.A.C.S.].

Diseases commonly met with in Melanesia and Polynesia. Their Diagnosis, Prevention and Treatment. 4th Edition. 95 pp. [1956.] Auckland: The Institute Printing & Publishing Society Ltd., P.O. Box 5053, New Zealand.

This small book, appearing in a fourth edition, has been somewhat enlarged to include the diseases of Polynesia. In the earlier editions its subject matter was confined to those of Melanesia, where the author served for many years in the Melanesian Mission. As the author states in his preface, the diseases commonly seen in Melanesia (Western Pacific) include those seen in Polynesia (Eastern Pacific), though the reverse is not the case.

The volume is not intended for the medical man. Its purpose is to supply information on symptoms and on disease and its treatment in a form suitable for the layman away from immediate medical aid. As notes for the guidance of field workers in the Melanesian Mission it fulfils its purpose, and it would be carping to criticize it in detail. Nevertheless, the use of the wide choice of expensive and often toxic synthetic drugs and antibiotics advocated in the treatment of certain conditions strikes one as rather beyond the competence of laymen. *A. R. D. Adams*